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Original Articles.

MAINTENANCE OF SATISFACTORY AIR TEMPERATURES IN LIVING SPACES AND WORKING SPACES IN SHIPS OF THE BRITISH NAVY.[1]

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It is now universally recognized that under ordinary conditions the ill-effects which are experienced by the occupants of a badly ventilated compartment are due to physical changes in the air and not to chemical changes and that ventilation implies not only adequate renewal of the air in any space but also the maintenance of the air in a satisfactory condition as regards temperature moisture and movement. Of these three conditions temperature is the most important.

It is evident that ventilation and heating must be very closely associated, indeed so close is this association that it is difficult to discuss the two subjects separately. Natural ventilation is due largely to differences in temperature between adjacent masses of air and in H.M. ships where the heating of the larger living spaces is carried out by warming the air supplied on the plenum system the interdependence of ventilation and heating is still more apparent.

The maintenance of suitable air temperatures in living spaces in H.M. ships, which during their period of service may be stationed in different parts of the world and exposed to all kinds of climatic conditions has always been a difficult problem. When in the tropics excessive heating

[1] A Paper read at the Ghent Congress 1927. Reprinted by kind permission from the *Journal of State Medicine* vol xxxv No 10.

[illegible] heat in [illegible] when [illegible] during the winter months. [illegible] would [illegible] ships [illegible] be specially [illegible] the [illegible] and [illegible] climates respectively, but [illegible] can [illegible] general application as it is essential [illegible] war should [illegible] will be suitable for [illegible] climates. In [illegible] has first become a factor of [illegible] importance. [illegible] there that in the [illegible] suitable air temperatures [illegible] the limitation of heat and prevention of over heating in living spaces [illegible] subject of even greater importance than those which deal with actual methods for supplying heat.

The following [illegible] will require consideration (1) Will heat and methods for its control [illegible] heating in the tropics and [illegible] [illegible] and its control [illegible] heating arrangements in cold weather.

In order, however, to understand the various problems with which we are confronted when dealing with air temperatures on board ship it is necessary to have clearly in our minds the elementary facts regarding heat transference, and I propose at this point to indicate these very briefly.

The transfer or spread of heat is brought about by radiation, convection and conduction. By radiation is meant the direct passage of heat from warm bodies to colder ones, the heating rays passing through the intervening air. The ordinary coal fire is a typical example of this method of heat transference, the intensity of the heat being inversely as the square of the distance of the object receiving it.

Conduction is the term used to describe the passage of heat through a substance from one molecule to another. This method of heat transference [illegible] important bearing on board ship. Iron and steel are good conductors [illegible] in hot climates external heat is quickly transferred to places within the ship, whilst in cold climates internal heat is rapidly removed. In the [illegible] ship [illegible] excessive heat and excessive cold have to be combated [illegible] more difficult now to maintain suitable air temperatures in living [illegible] in the days when men of war were built of wood. Wood [illegible] with iron or steel is a poor conductor. The internal heat in the [illegible] was conserved in cold weather, excessive heating was largely [illegible] weather, and so the temperature of the air on board was [illegible] equable.

The rapid transference of heat through the framework of a ship can [illegible] by sheathing or lining the ship's sides with various non-con[illegible]. Air is a very feeble conductor of heat, hence the use [illegible] lining in the construction of modern ships by means of [illegible] spaces are formed in the ship's sides. Wood, cork and asbestos [illegible] of which in the limitation of heat will be described later [illegible] poor conductors.

The deposition of moisture on the internal surfaces of walls of com[illegible] commonly known as "sweating" is due largely to the rapid

[illegible] takes place through the steel framework. In [illegible] marked difference between the temperature [illegible] within the ship heat is rapidly lost owing [illegible] compartment walls. The air in a com[illegible] metal plates becomes colder and [illegible] the temperature of this air falls sufficiently low to [illegible] saturation. Sweating results chiefly on the walls of compartments which are formed by the ship's sides. It may be met with also overhead in [illegible] just below the upper deck, but on interior walls or bulkheads the [illegible] of the air seldom occurs to such an extent as to lead to any marked deposition of moisture.

Sweating is an unhygienic condition not only because of the moisture laden with organic matter which is deposited, but also because it indicates differences in temperature in a compartment which are prejudicial to health. The air in contact with the sweated area is much colder than the air in the space generally, and in the case of mess decks, where accommodation is limited, a certain number of the occupants will be exposed to chills. Every effort should be made to prevent "sweating" in living spaces on board ship. The condition is much alleviated by adequate ventilation and suitable warming of the air supplied in cold weather. But measures must also be taken to lessen the high conductivity of metal framework. In all living spaces the dissipation of heat should be reduced to the utmost possible extent by lining the external walls with the best non-conducting material available. Wood sheathing was formerly extensively used, but in the modern man of war wooden fittings, owing to the danger from fire, have been largely eliminated.

Cork paint, also called cork cement, has been employed for many years in our ships in the prevention of "sweating." This preparation of finely granulated cork when properly applied to exposed steel surfaces forms a good non-conductor under certain conditions. It can be employed with advantage for covering bulkheads and the under sides of decks, but on surfaces exposed to greater degrees of cold it does not give sufficient protection. In connection with the use of cork paint it is important to remember that surfaces coated with this preparation are granular and are therefore more difficult to keep clean.

Cork can also be utilized in the form of compressed slabs. These slabs about 1 in. in thickness form a covering for steel surfaces which is much more efficient than cork paint as a non-conductor, and the finished surfaces are much smoother. This method of utilizing cork on board ship is, however, difficult in application and has so far been little used in H.M. ships.

For the prevention of sweating on external walls of compartments which are exposed to the greatest cold, an inner lining or sheathing is desirable. The air space, which should be several inches deep, formed between the sheathing or inner skin of thin metal plating and the steel sides of the ship diminishes very markedly heat loss and so prevents deposition of moisture.

Th[illegible] which h[illegible] A[illegible] a poo[illegible] for the convection of heat by air is an important factor in all [illegible] ventilation and heating When air is heated it expands [illegible] lighter volume for volume than colder air Heated air th[illegible] and is replaced by colder air In this way convection [illegible] in a compartment in which the air is warmed by the [illegible] of the occupants or other heated objects, such as stoves and [illegible]

When [illegible] during the winter months in temperate climates it is [illegible] that a temperature of about 62° F is comfortable and [illegible] most people During the summer months by suitable chang[illegible] comfort can be maintained at considerably higher temperat[illegible] As is well known the body can accommodate itself to wide var[illegible] in temperature but with marked discomfort, and the possibility of [illegible] health when the variations are extreme In living spaces [illegible] is required which is neither too hot nor too cold

It is not necessary [illegible] purposes of this paper even if time would permit to discuss at any [illegible] effects of humidity on comfort conditions Although the [illegible] of temperature depends on the wet-bulb reading the dry bulb [illegible] is a more useful index for comfort conditions in compartments which [illegible] artificially heated In such compartments provided the temperature is neither too high nor too low a wide variation in humidity may occur without altering materially the comfort of the occupants For all practical purposes if the temperature of a compartment is maintained between 60° to 65° F humidity may be disregarded but when the temperature is allowed to fall below 60° F, or rise beyond [illegible] 70° F humidity becomes an important factor As the temperature falls the chilling effect of the air is increased in proportion to the moisture [illegible] the more readily can comfort be maintained in a cool atmosphere As the temperature rises beyond 68° to 70° F, increase in [illegible] makes itself felt by lessening the evaporative power of the air and [illegible] heat loss from the body

C[illegible] zones defined by temperature and humidity have been [illegible] by different workers on ventilation In general terms it may [illegible] that in temperate climates the comfort zone extends approximately between 60 and 70° F, with a relative humidity varying between [illegible] per cent

[illegible] greatest care must be taken to prevent overheating in living and working spaces As the temperature rises much above 65° F symptoms such as lassitude general discomfort and even headache may be experienced and the capacity for mental and physical work lowered Under such conditions also, especially on board ship where men may have to go on deck at any time chills are liable to occur on exposure to the colder external air and the incidence of respiratory diseases is increased

It [illegible] that in the living [illegible] in H.M. ships [illegible] should [illegible] the temperature of the [illegible] as [illegible] between the range 65° to [illegible] compartments in [illegible] work is being carried out a temperature [illegible] a degree or two lower may be found to ensure better [illegible] but in no case should the temperature be allowed to exceed [illegible]

Wild Heat.—With the advent of steam [illegible] wild heat—was introduced in naval hygiene which has added materially to the difficulty of maintaining satisfactory air temperatures [illegible] ship. In the early days of steam, when our ships were built of wood, the heat generated in the comparatively small engine and boiler rooms was not sufficient to cause much discomfort in living spaces. But with the introduction of the steel ship constructed of materials of high conductivity, a change accompanied by an increase in steam power and increased heating space, the effects of wild heat became very apparent.

As the application of steam power became wider, sources of wild heat were increased, and in the modern man-of-war the control of heat arising not only from the main engine and boiler rooms but also from steam pipes, auxiliary engine rooms, and dynamo rooms has become a most difficult problem. Other sources of wild heat besides those already indicated are bakeries, galleys, wash places, bath rooms, laundries, heaters for supplying hot water in such places as pantries and the sick bay, and hot food ovens. Modern requirements have increased the range of wild heat throughout the ship.

Although in cold weather the invasion of living spaces by wild heat may help in maintaining satisfactory air temperatures, in warm weather, especially under tropical conditions, it increases still further the already high temperature in the various compartments affected. Every effort must therefore be made to limit and control wild heat in whatever part of the ship it is met with to the utmost possible extent.

Much can be done in the limitation of wild heat when ships are under construction. Engine and boiler rooms should be provided with efficient ventilation in order that heated air may be rapidly removed. The high conductivity of the walls containing these spaces must be lowered by the free use of non-conducting materials, and full use must be made of the latter in lagging or covering all steam pipes and exposed parts of boilers and other heater surfaces.

In auxiliary engine rooms and dynamo rooms similar precautions must be taken. To ensure rapid removal of the heated air from these spaces and an ample supply of fresh air, artificial exhaust ventilation combined with an artificial supply is desirable.

Much can be done also in combating excessive heat in living spaces by choosing suitable sites for such important sources of wild heat as dynamo and auxiliary engine rooms. Care should be taken when the plans of a ship are being prepared that these compartments are removed as far as possible from living spaces.

The steam pipes throughout the ship leading to the various auxiliary engines are important sources of wild heat which must be remembered. These pipes when they pass through living spaces must be adequately lagged. A good non conductor for this purpose is asbestos in the form of corrugated sheets which should be applied in several layers round the lengths of piping. Asbestos in the form of light blocks is also made use of in H.M. ships. These blocks can be employed with advantage on the undersides of decks and on bulkheads which are exposed to excessive heat.

By the measures outlined above wild heat from the various sources throughout the ship can be considerably reduced, but further steps must be taken to control the heat which must still tend to invade living spaces. The encroachment of heat on living spaces can be limited by applying cork paint in several layers on ceilings and bulkheads, and covering the decks with corticene.

Corticene being composed largely of cork is a good non conductor and having a smooth impervious surface it is readily cleaned. It is made of finely granulated cork and linseed oil, backed with canvas and when well laid down and fixed in position by an adhesive preparation, such as a mixture of orange shellac and methylated spirit forms a most useful covering for deck plates. Care should be taken to see that the corticene remains closely attached to the surface to which it is applied, otherwise dirt and dust traps will be formed. Wear and tear at the junctions and edges can be largely prevented and close apposition of the surfaces ensured by using in addition to the adhesive preparation strips of brass or galvanized iron which by means of tapped bolts and nuts fasten the corticene securely to the decks.

The choosing of suitable sites for living quarters is an important consideration in the prevention of wild heat. It is not possible in a man of war in which difficulty is experienced in obtaining accommodation for the men to have all the crew spaces situated sufficiently apart from sources of wild heat: some of the mess decks in each ship must of necessity be in close proximity to the main engine or boiler compartments, but the sites of certain smaller compartments should be carefully allocated. The sick bay should be well removed from wild heat, also as far as practicable the [illegible] offices, wireless telegraphy compartments, transmitting station [illegible] distributing stations and workshops.

The part played by adequate ventilation in the control of wild heat at its source has been described. Ventilation is also an important factor in combating heat, which notwithstanding all precautions has actually invaded living spaces, and in this respect the plenum system used in H.M. ships is most useful. Overheating in living spaces is materially reduced by the rapid renewal of fresh air which is ensured by this method of ventilation.

[illegible] Tropics and its Control

[illegible] serving in [illegible] climates the living spaces [illegible] exposed [illegible] [illegible] heat generated within the ship but also to heat from without. [illegible] unless steps are taken to prevent it, rapidly increases the [illegible] of the plates composing the decks and sides, and is thus [illegible] apartments within the ship. A certain amount of over-[illegible] unavoidable in the tropics not only because of the direct action of [illegible] on the framework of the ship which cannot be entirely prevented but also because of the physical condition of the air which is available for supply. The air outside the ship is in itself often so warm and moist that it can be of little help in maintaining a satisfactory physical condition of the air on board. Hence the necessity for a generous supply of table fans to ensure wider movement of the air and greater cooling power.

Wild heat must be combated on the lines already described and it must be counteracted to the utmost extent possible at the various sources, because when it has invaded living spaces it cannot be diminished to the same extent by ventilation as in temperate climates owing to the already high temperature of the external air. All possible sources of wild heat within the ship must be examined and lagging with non conducting material carried out in each case as far as is practicable. Special care must be taken in the case of engine and boiler rooms; the decks over these and bulkheads enclosing them, which are such important sources of wild heat, should be adequately lagged, especially when they help to form living compartments. In such situations a double skin can be used with advantage. Steam pipes throughout the ship including those leading to bath rooms, galleys and pantries should be lagged and care should be taken to see that steam is shut off from all pipes when not required. In the case of bathrooms it is desirable when in the tropics to arrange for steam to be laid on at stated periods only, say for two hours in the morning and two hours in the evening.

In temperate climates lesser sources of wild heat may help in maintaining comfort conditions and no control will be required, but in the tropics efforts must be made to limit every source of heat within the ship however small. The extent of steam piping throughout the ship can be reduced by utilizing wherever practicable electric instead of steam driven machinery. Wild heat which makes itself felt so much in small compartments such as pantries can be much reduced by employing electric hot-water heaters instead of those which are heated by steam.

A considerable amount of heat results from the electric lighting. In many parts of the modern man-of-war artificial light is necessary both day and night. It is therefore important to see that efficient lighting is obtained with a minimum of heat production. In this connection it should be remembered that the amount of heat per candle power given out by an

electric bulb in which carbon filaments are used is about four times that which is produced by a bulb fitted with metallic filaments

A source of wild heat not apparent in temperate climates but frequently met with in the tropics is the water which is distilled on board for drinking purposes Excessive heating is caused in the tropics in living spaces situated above the storage tanks because the distilled water condensed in the usual way when passed to the tanks is still at a high temperature It is therefore important that storage tanks should be situated well apart from living compartments When this cannot be arranged the deck plates above the tanks should be lagged and measures taken to reduce the temperature of the distilled water at its source This can be done by passing the water after it leaves the condenser through a cooler before delivering it to the storage tanks During recent years these coolers which, like condensers, consists of metal cylinders containing tubes through which cooling water is circulated, have been used in H M ships in warm climates with very satisfactory results

Measures must be taken to diminish as far as possible the amount of heat absorbed by the decks and sides of the ship and also to prevent the heat which notwithstanding every precaution will be stored up to some extent in these situations, from entering living compartments External heat can be controlled by (1) White paint (2) awnings (3) non conducting materials Colour has an important influence on the effects of sunlight The heating effect of the sun s ray on any substance depends on the extent to which the rays are absorbed Absorption of heat can be reduced by increasing the amount of heat which is reflected and this can be done in the case of the ship s sides by coating them with white paint White is preferable to darker colours in warm climates because it ensures the greatest reflection and therefore the least absorption of heat

In the case of fighting ships however other factors have to be considered White is not a good war colour Glare is excessive and the ship is rendered too visible not only by day, but also by night And so white paint which was used for many years for the sides of our ships serving in warm climates has been replaced by grey The lighter the colour the greater the protection against the sun s rays A very small amount of black added to white paint is sufficient to produce a colour which will be a considerable protection against heat and will also be suitable during war The light-grey paint used by H M ships on the Mediterranean station is made by mixing one part of black with 144 parts of white This light grey paint would be suitable also for our ships in the tropics

Awnings are of great service on board ship not only because of the protection they afford against the sun s rays but also because of the shelter they provide on the upper deck for officers and men in wet weather As an additional protection in the tropics double awnings can be used with advantage on the upper deck

The awnings used in H M ships are made of strong light grey coloured

canvas, and provision is made in the case of those for the upper deck for increasing the slope or inclination of the sides in wet weather. Awnings are most useful also in lessening the effect of the sun's rays on the ship's sides. Side awnings should be used whenever practicable to shield important compartments such as the sick bay. Their use is limited at sea, but when under way in fine weather the external wall of the sick bay if exposed to the sun should always be protected.

Sheathing the inside of the outer walls of compartments with wood which was carried out in former years in our ships to restrict the passage of heat has been abandoned owing to the risks from fire and also from splinters when in action. In place of wood an inner skin of metal sheathing is now employed. This inner skin formed of light metal plating, encloses an air space several inches deep and thus ensures a most valuable means of protection against extremes of temperature. This method of limiting heat should be employed as far as is practicable in all living and working spaces.

By such measures high temperature conditions can be much alleviated, and a considerable degree of comfort ensured for officers and men in ships stationed in the tropics. Comfort as known in temperate climates is, of course, unattainable without employing measures for cooling the air. But provided suitable precautions are taken to prevent excessive heating, cooling as a general measure throughout the ship should not be required. The importance of air movement in relation to cooling power is well known, and the great value of air movement as the temperature rises can be demonstrated by the kata thermometer which is now supplied for use in our ships. Although in the tropics, as will be readily understood, the loss of heat by radiation and convection is frequently so small that no dry kata readings are obtainable the wet kata which measures loss of heat due to evaporation, gives us valuable information. Hill has shown that in still air at 89° F the cooling power of the air indicated by the wet bulb is 3·8 if, however, the wind velocity be 9 metres per second it becomes 15.

Much of the discomfort on board ship in the tropics was removed when the table fan was introduced. A liberal allowance of these fans should be provided for use in all living and working spaces, and care should be taken to see that the fans allotted to each compartment are placed in such positions as will ensure the most beneficial effects on the occupants. For use in large compartments fans should be preferably of the traversing type so as to ensure increased air velocity over a wide area.

Windsails and *windscoops* are of great service in the tropics. Every advantage should be taken of the increased circulation and movement of air in spaces between decks which can be brought about by their use.

Sleeping on deck should be encouraged. This practice which has become more frequent in warm climates is desirable not only because the open air ensures more comfortable conditions for those actually on deck, but also because overcrowding in spaces between decks is reduced. To

[illegible] such as hammock books [illegible] weather decks of ships [illegible] In wet weather sufficient shelter can be provided [illegible]

[illegible] played by suitable clothing in promoting [illegible] Men working in spaces between [illegible] [illegible] jumpers in order that heat loss from the [illegible] In temperate climates also the same procedure [illegible] advantage It is most undesirable for men engaged [illegible] compartments to be fully dressed in out-door clothing, not [illegible] interfered with, but also because of the risks of [illegible] outside air

[illegible] of the air between decks in ships in warm climates [illegible] the air supplied on the plenum system through [illegible] however it must be remembered that the [illegible] plant [illegible] severely taxed not only by magazine [illegible] but also by [illegible] required for cold storage both of which are [illegible] in the tropics Considerable increase in the size of the cooling plant would therefore be required in order to cool the air supplied to living [illegible] spaces throughout the ship This would mean a further [illegible] on the living accommodation and such a contingency must [illegible] possible

[illegible] indicated already that provided due precautions are taken [illegible] excessive heating and to increase to the utmost extent possible [illegible] power of the air cooling for general use should not be required [illegible] apparatus must be installed for cooling the air in any compartment [illegible] in which the temperature may rise to an extent which [illegible] life Measures for cooling the air could also be employed [illegible] advantage in the case of workshops situated in close proximity to [illegible] which cannot be effectively insulated More efficient work [illegible] thus be ensured

Heating Arrangements in Cold Weather

[illegible] degrees of heat are necessary in all living spaces in cold [illegible]

[illegible] ships the methods of heating employed are (1) Indirect— [illegible] (2) Direct [illegible] stoves [illegible] electric radiators

[illegible] method of heating is used in large living spaces such as [illegible] In this method measures are employed to warm the air [illegible] the plenum system before it is distributed to the different [illegible] compartments Steam heaters are used for this purpose The steam [illegible] consists essentially of a steel chamber or tank containing tubes [illegible] which steam can be passed, placed in the ventilation circuit of a [illegible] (fig 1) By means of an angle piece controlled from the outside [illegible] the air can be directed through a heater as required When the

temperature of the outside air is sufficiently high and no warming is necessary the air is allowed to pass on without entering the heating chamber, the by pass to which is shut off. When it is desired to heat the air steam under low pressure is admitted to the tubes and by means of the hand lever the by pass to the latter is opened as required to allow the necessary amount of air to pass through. In this way by suitable adjustment of the lever the temperature of the delivered air can be regulated.

Steam heaters increase to a certain extent the resistance to the air flow and so diminish the volume of air supplied. The larger the amount of air passed through the heater the greater the resistance. In temperate climates it should rarely be necessary to pass more than one third of the

Fig. 1

air through the heater in order to obtain the desired temperature; warming the air to this extent reduces the supply by about $2\frac{1}{2}$ per cent. Due allowance should therefore be made for the increased resistance caused by the heaters when drawing up plans for the ventilation of living spaces in order that the required amount of air per head may be forthcoming under all conditions.

The greatest care must be taken when steam heaters are in use to prevent overheating in living spaces. Much of the adverse criticism to which this combined system of ventilation and heating as fitted not only in ships but in shore establishments has been subjected has been due to neglect of this precaution. In the early days of the steam heaters there were frequent complaints from officers and men not only because of the

high temperature of the air in living spaces but also because of its dryness. Excessive dryness is due to overheating, and provided the latter is guarded against the relative humidity will not fall to such an extent as to cause discomfort. The addition of moisture to the warmed air by means of humidifiers is therefore not necessary.

The officer in charge of the ventilation party which is now formed in all our ships, should take the necessary steps to ensure adequate control of the heaters. The temperature of the air in living spaces should be noted at intervals during the day and night, and the heaters regulated accordingly. As already pointed out the temperature of the air in living spaces should not be allowed to exceed 65° F. and preferably should be kept at about 60° to 62° F. Care should be taken to see that the thermometers used in compartments are sufficiently removed from the warm air inlets, otherwise the temperature of the air as it enters the compartment will be recorded, and this must always be considerably higher than the temperature in the space generally.

There can be no doubt that a combined system of heating and ventilation such as has been described is the most simple for general use in H.M. ships. It has often been suggested that the employment of so called steam or hot water radiators would be satisfactory for heating purposes, but it would not be possible in cold weather with any direct method of heating to supply the large volumes of air required in such places as the mess decks without causing discomfort to the occupants. One of the great problems in ship ventilation is the prevention of draughts, and a great advance was made in this direction in 1914 when what is known as the "deflector system" for distributing the air passing along the trunks was introduced. By means of deflectors or baffles so arranged as to ensure an even distribution of the air from each opening, unpleasant draughts can be avoided provided the temperature of the outside air does not fall below 60° F. But at lower temperatures in the case of the large compartments under consideration it is essential in order to prevent discomfort to provide means for warming the air which is supplied.

It must be remembered that the amount of heat required by different compartments in order to maintain the desired temperature in each may vary considerably depending chiefly on the extent to which they are affected by wild heat and on the rate of heat loss. The same heating apparatus should therefore not be used for several compartments unless the conditions affecting the temperature in each are approximately the same, otherwise adequate control would be impossible. Each large compartment should preferably have its own heating unit.

Before the introduction of electricity, stoves were largely used in H.M. ships for heating purposes. Coal burning stoves of the closed type are still used in officers' messes, admirals' and commanding officers' apartments and in sick bays.

The danger of CO poisoning must always be remembered when stoves

... employed [illegible] must be [illegible] that the products of combustion do not enter the compartment The necessary draught up the flue should be ensured by trimming the funnel on deck and when the funnel has to be unshipped and the opening in the deck closed by a deck plate, care must always be taken to see that the fire in the stove is completely cleared beforehand

The danger of CO poisoning is greatest in compartments such as the forecastle crew spaces in many of our auxiliary ships in which natural ventilation is alone available and where the air inlets may be closed during inclement weather to keep out cold or wet The precautions to be taken under such conditions to guard against CO poisoning are dealt with fully in an Admiralty order issued in 1918

In the smaller compartments such as cabins and offices heating is carried out by means of electric radiators The combined system of heating and ventilation is not suitable in such places owing to the wide variations in the amount of heat which is required The loss of heat in an outer cabin or office is much more rapid than in one placed amidships, and the extent also to which these compartments are exposed to wild heat varies considerably The occupants of the compartments in which less heat is required would frequently find it necessary if indirect heating were in use to shut off the hot air supply and consequently the ventilation in order to maintain an equable temperature It is therefore desirable that the heating of cabins and offices in which the air supplied on the plenum system can be distributed without causing draughts should be self contained

The electric radiator is a most valuable heater not only for use in surface ships but also in submarines It is simple and cleanly, and produces no combustion products to pollute the air

Electricity has rendered valuable services to naval hygiene It has made good lighting possible and improved air conditions on board ship by eliminating the pollution which resulted from the use of lamps and candles With heat throughout the ship has been reduced by using electricity in place of steam for working ventilation fans and many auxiliary engines Electricity has made it possible to ensure efficient ventilation in ships It may be said indeed that without electrical power satisfactory air conditions in the modern man of war could not be maintained

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THE SURGICAL TREATMENT OF ACUTE APPENDICITIS AND ITS COMPLICATIONS

[illegible] F.R.C.S.Edin., Surgeon Lieutenant R.N.V.R.
[illegible] the Surgical Unit, The Welsh National School of Medicine, The Royal Infirmary, Cardiff

[illegible] did me the honour of asking me for a paper on [illegible] subject I was somewhat at a loss how to meet his request until it [illegible] to me that to look back over some notes of cases of appendicitis [illegible] result in something which was at least the result of a fairly extensive practical experience. A certain degree of lethargy is liable to characterize an attitude towards procedures which are so frequently repeated that they become almost reflex. It will be admitted then that from time to time it is desirable to review such procedures in the light of accumulated experience.

In looking back over my last 350 appendicectomies, I have come to certain conclusions which I propose to set forth in the hope that they might prove helpful to some and if not useful at least stimulating to others. I do not intend to elaborate the diagnosis, treatment and complications of appendicitis but merely to touch on certain points that appear to me [illegible] of a review of these cases.

Diagnosis.—In the first place have we any train of signs or symptoms pathognomonic of appendicitis? My experience substantiates the truth of J. B. Murphy's syndrome and I venture to assert that although cases of appendicitis occur in which this syndrome cannot be elicited, yet where it does occur the case is almost certainly appendicitis. The syndrome consists of the appearance in order of time of (*a*) epigastric pain, (*b*) vomiting, (*c*) tenderness in the right iliac fossa, (*d*) rise in temperature. Many cases however do not show this syndrome, and without going into the complete differential diagnosis of acute appendicitis the conditions which in my experience may resemble it are: (*a*) acute salpingitis, (*b*) colon bacilluria, (*c*) perforation of gastric or duodenal ulcers, (*d*) annular carcinoma of the colon, (*e*) acute cholecystitis, and (*f*) chest conditions such as pneumonia.

The cases which are most likely to lead to mistakes in diagnosis are those in which the appendix is retrocaecal in position, especially if descent of the caecum has been incomplete and if there is a deep retrocaecal fossa. Retrocaecal appendicitis may be said to constitute one of the snags of abdominal surgery:—

A bricklayer, aged 23, complained of pain in his back and right side, loss of appetite and inability to pass urine. His temperature was normal but the pulse rate 104; the abdomen moved easily on respiration. There was slight tenderness in the right lumbar region. A radiogram of the urinary tract proved negative.

two days after the onset [illegible] is passing urine normally sleeping well his appetite [illegible] had but he had a rigor. A diagnosis of retrocæcal appendicitis was made [illegible] under gas and oxygen anæsthesia through a right paramedian incision [illegible] was [illegible] On mobilizing the cæcum and ascending colon a [illegible] abscess was found and a sloughing, gangrenous appendix which was amputated [illegible] the abscess was drained through stab punctures in the right loin and flank [illegible] uninterrupted recovery

I remember [illegible] coming into a hospital in which I was a resident. The history was vague and he was almost moribund. His skin was yellow [illegible] an oscillating temperature. He had an old standing mitral lesion with a soft systolic bruit. The abdomen moved well with respiration [illegible] and only very slightly tender. A diagnosis of ulcerative endocarditis had been suggested. At the post-mortem examination retrocæcal appendicitis was found

It is practically impossible to predict the condition of the appendix before opening the abdomen in the early stages of the disease. The appendix may be [illegible] gangrenous when the early signs and symptoms are but slight. I have found that when this is the case it is not uncommon to find that a stercolith has engaged in the proximal part of the lumen and presumably by locking up fæcal material in the distal part of the organ and [illegible] interfering to a certain extent with the blood supply given rise to the condition described by Professor D. P. D. Wilkie as acute appendicular obstruction

Treatment.—Next when confronted with a case of acute appendicitis what is the best treatment? Is immediate operation essential? This question is of great importance to the surgeon at sea who often has poor conditions under which to carry out major surgery conditions which may well handicap the chances of success of any operation. Early operation i.e., within the first forty-eight hours is desirable but in my opinion, where conditions for operating are poor and the risk therefore higher than necessary, conservative treatment may be advisable for the time being, the patient being kept in bed and given fluids only, avoiding aperients. At the same time preparations should be made for operation which must be undertaken if exacerbation of the signs and symptoms occur. By such means it may be possible to land a case in hospital on shore and avoid an operation, the risk of which may be considerably greater if carried out at sea

When travelling in a liner to New Zealand I was asked to see an engineer lieutenant commander, a passenger on board who was seized with abdominal pain and vomiting. I diagnosed acute appendicitis but owing to lack of facilities prepared for operation but decided not to open the abdomen unless this became imperative. He was kept in bed on fluids, and although there was no doubt as to the diagnosis the condition did not progress, and in four days time the ship arrived at Colon, where the necessary preparations in the local hospital having been arranged beforehand by wireless from the steamer the operation was successfully performed at in my opinion considerably less risk to the patient

Where [illegible] possible *e g*, in a large hospital, early operation [illegible] except in those cases which are seen for the first [illegible] an attack which is subsiding In that case since the [illegible] shown to be highest on the third day, the immunity [illegible] it is better to delay operation until after the fifth day If, however, the condition is lighting up operation must be undertaken forthwith

The Incision and Method of Treatment —I have practised many incisions and find the three best to be (*a*) the paramedian (*b*) Battle's (*c*) the muscle splitting or McBurney's

(*a*) The paramedian incision is most often indicated It is sound because the segmental nerves are not cut and a hernia is practically impossible subsequently provided the incision through the rectus sheath is made well out from the linea alba *i e* over the mid line of the sheath and if after closing the peritoneum one or two stitches are placed between the inner edge of the muscle and the linea alba so as to prevent diverication

(*b*) Battle's incision should be carefully made to avoid cutting the segmental nerves Because of its relation to the appendix and especially to an abscess it is a useful approach, but drainage of the abscess cavity should not be carried out through the incision, but by separate stab wounds

(*c*) The muscle splitting incision I reserve almost exclusively for early definite, first cases in children in whom no further procedure than appendicectomy is likely to be necessary The overlapping muscle planes effectively guard against hernia and at the end of a week it is possible to discharge from hospital cases so treated The disadvantage of the incision is the limited exposure allowed

Drainage —Frank abscesses need drainage and this is best carried out through stab punctures The line of incision can be drained with a rubber wick In cases with localized or general peritonitis, drainage for a period of from twenty-four to forty-eight hours is sometimes desirable Since prolonged drainage of the peritoneal cavity is a physical impossibility it having been shown that if after introducing a drain into the peritoneal cavity of dogs a large amount of coloured fluid be injected into the cœlom immediately below the ensiform cartilage in twenty-four hours the drain is so effectively shut off that no fluid escapes by it drainage tubes in the peritoneal cavity after forty eight hours are not only useless but sources of infection resulting in sinus formation and dense adhesions, potential causes of obstruction later With an abscess cavity lined by a pyogenic membrane however, this does not apply drainage is generally necessary for some time but even here the tendency is to be too conservative The tube should be turned and shortened daily

Complications —In my experience the following are the common complications that necessitate further treatment —

(1) *Ileus* —Paralytic ileus can usually be dealt with effectively by

[illegible] turpentine enemata or by eserin salicylate given four hourly, since [illegible] doses of pituitrin are not desirable. Mr Rendle Short's method of triple attack, croton oil 2 minims, followed by an alum enema [illegible] and immediately after its administration an intramuscular dose of [illegible] has proved useful in a very bad case. Ileus due to adhesions may necessitate further operation shortly after the appendicectomy or at a much later date.

Early Obstruction.—On February 10, 1927, I removed through a [illegible] splitting incision the appendix of a boy aged 11; the appendix was gangrenous and the coelom contained purulent fluid. A drainage tube was inserted into the pelvis. Five days later he complained of abdominal pain which [illegible] became very acute. When I saw him [illegible] peristalsis was present. He looked extremely ill and was vomiting persistently. He was at once given large infusions of 1 per cent. sodium chloride and 10 c.c. of [illegible] intravenously, and high jejunostomy by Coffey's method was performed under gas and oxygen anaesthesia. The obstruction was due to some [illegible] adhesions at the site of appendicectomy. These were easily broken down. His condition improved and he made an uneventful convalescence.

Late Obstruction.—The time intervening between the appendicectomy and the presence of obstruction and the [illegible] of the obstruction make the following case of interest:—

A miner, aged 36, was admitted to hospital because of chronic intestinal obstruction. I found the obstruction to be due to [illegible] round which a coil of intestine had rotated [illegible] direction. Adhesions were present in relation to an old operation wound through which appendicectomy for acute suppurative appendicitis had been performed [illegible] two years previously. This patient made an uneventful recovery.

(2) *Subphrenic Abscess*. This complication is illustrated by the following case:—

A bugler, aged 23, was admitted to hospital on January 12th, 1927, suffering from acute appendicitis. Appendicectomy [illegible] through a right paramedian incision; the coelom contained purulent fluid and the appendix, which was retrocaecal in position, was gangrenous. Two days later [illegible] were 32; he had developed a cough, and his temperature, which had fallen to normal after his operation, began to rise again [illegible] an X-ray examination showed the diaphragm [illegible] on the right side, and on the 16th a needle introduced into the [illegible] intercostal space [illegible] through the diaphragm encountered foul-smelling pus. [illegible] anaesthesia, part of the tenth right rib was resected, the two layers of pleura stitched together and the diaphragm incised. Between its right cupola and the liver lay a large abscess cavity from which [illegible] 100 c.c. of pus were evacuated. The abscess cavity was drained by a tube.

He made an uneventful convalescence and returned to his bugling in the Army.

(3) *Faecal Fistula*.—This is sometimes a saving factor by acting as a safety valve, very rarely necessitating treatment since it almost always closes spontaneously, and is not usually a serious complication, the convalescence being delayed to only a slight extent.

[illegible] further points [illegible] operation [illegible] Two of [illegible] for [illegible] by other [illegible] appendicectomy had not been performed and an abscess merely drained Both cases had second attacks of acute suppurative appendicitis and although the operation was somewhat difficult I was fortunate in securing the remains of the appendix in each case Both of these men made uneventful recoveries

In cases in which owing to the position or condition of the appendix or the presence of adhesions, the operation is difficult I find it useful to identify the base (the ileo-colic angle and the tænia coli are the landmarks) and amputate in a retrograde fashion, touching the exposed mucosa with pure carbolic acid or formalin The stump is buried in the cæcal wall with an *N* stitch

In closing the abdomen it is as well to use a few interrupted stitches in the rectus sheath in case a single continuous stitch gives way earlier than expected This is not unknown with catgut Alternatively one may use silk or thread sutures for the rectus sheath, but I prefer to use a continuous catgut stitch with several interrupted sutures, and except on very rare occasions I never use deep silkworm gut sutures

To summarize

(1) If Murphy's syndrome is present the case is appendicitis, but absence of Murphy's syndrome does not imply that the case is not appendicitis

(2) The conditions that most commonly necessitate a differential diagnosis are colon bacilluria, pneumonia, acute cholecystitis, acute salpingitis perforation of gastric or duodenal ulcers

(3) Operate within forty eight hours if conditions permit

(4) If at sea and conditions are not highly favourable for the success of an operation, adopt conservative treatment but prepare for operation

(5) If the case is seen for the first time on the third day and is retrogressing do not be in a hurry to operate

(6) The best incisions are : Right paramedian Battle's, gridiron (especially for quite definite and early first attacks in boys)

(7) Remove the appendix The retrograde method may be helpful in difficult cases

(8) If drainage is necessary, use split rubber tubes and separate stab incisions

(9) Remove drains early It is useless to attempt to drain the cœlom for more than twenty-four hours A definite abscess cavity lined by pyogenic membrane requires longer drainage

(10) The common complications that may necessitate subsequent operation are intestinal obstruction and subphrenic abscess

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CAPTAIN JAMES COOK, R.N., F.R.S., AND HIS CONTRIBUTION TO MEDICAL SCIENCE

By R. T. WILLIAMSON, M.D., F.R.C.P.

THE story of the life of Captain Cook was familiar to English readers in the last century, but it is now ancient history, or its details are little known to men of the present age. Yet his record of his three last voyages is still intensely interesting, and his contribution to medical science is worthy of being retold.

James Cook was born at Marton, near Whitby, in Yorkshire, on October 27, 1728. He was the son of a labourer, and briefly stated the following was his career:

At an early age he was apprenticed to a shopkeeper, but soon ran away to sea. He obtained a post on a ship at Whitby, and after some years at sea he entered the Navy in 1755. His merit was soon discovered, and he became master of the *Northumberland* in 1758, at the early age of 30. He endeavoured to educate himself alone, from books, and studied euclid, mathematics and astronomy. He did good service with General Wolfe at the siege of Quebec, and afterwards was engaged to survey the Gulf of St. Lawrence and the coast of Newfoundland.

In 1767 he was appointed to command a scientific expedition to the South Seas, to observe the transit of Venus. In this expedition he discovered the Society Islands, explored the coast of New Zealand and the eastern coast of Australia for 2,000 miles, and gave the name of New South Wales to the latter region. He hoisted the British flag in New Zealand and on the coast of Australia, and formally "took possession" of these regions in the name of King George III.

In 1772 he left England for his second voyage and explored the South Pacific Ocean, discovering the islands of New Caledonia and Georgia.

In 1776 he left England on his third and last voyage, in which he discovered the Sandwich Islands, explored the western coast of North America for 3,500 miles, and then returned to the Sandwich Islands, where he was killed in a fight, caused by a misunderstanding with the natives, at Karakakooa Bay in the Island of Owhyhee (Hawaii), in 1779.

His work as an explorer is concisely summarized in the words on the statue erected to his memory, close to the Admiralty Arch, London:

CAPTAIN JAMES COOK, R.N., F.R.S.

Born 1728, died 1779
Circumnavigator of the Globe
Explorer of the Pacific Ocean
He laid the foundations of the British
Empire in Australia and New Zealand

But it [illegible] that the best monument to his memory is the splendid chart [illegible] us of the Pacific Ocean.

In this [illegible] it is desired to draw attention especially to Captain C[illegible] to medical science—his successful method of [illegible] those days was the great scourge of the sea. [illegible] turned out without any of his men [illegible]

Captain [illegible] of the first expedition after the death of Captain C[illegible]

[illegible] so successfully pursued of preserving [illegible] and will transmit his name [illegible] mankind.

[illegible] the world, by repeated trials that [illegible] length of three or even four, years [illegible] change and rigour of climate not only [illegible] the probability of life in [illegible]

[illegible] of Captain C[illegible] conclusion of his account of his [illegible] worthy of being [illegible]

[illegible] may be the public judgment about other matters it is with [illegible] that of attention to my duty, [illegible] which facts enable me to [illegible] of preventing health amongst [illegible] varieties of climate, [illegible] make this voyage remarkable [illegible] persons.

[illegible] his method of preventing [illegible] paper to the ROYAL SOCIETY [illegible] published in the *Philosophical Transactions* vol. xvi, [illegible] for the year 17[illegible]

[illegible] paper to the Royal Society Captain Cook writes:—

[illegible] gentlemen [illegible] the uncommon good [illegible] health which the [illegible] on hand experienced [illegible] late voyage [illegible] on the methods that [illegible]

[illegible] method taken for preserving the health of the crew of H.M.S. [illegible] during her late voyage round the world. By Captain James [illegible] —*Philosophical Transactions of the Royal Society of London,* [illegible]

[illegible] of malt of which is made *sweet wort* and [illegible] manifest symptoms of the scurvy but to [illegible] judged to be most liable to that disorder) [illegible] to each man or in such proportion as the [illegible] sometimes amounted to three quarts in the [illegible] without doubt one of the best antiscorbutic sea

[illegible] *of Captain Cook* edited by [illegible]

[illegible] and [illegible] proportions [illegible] looking at [illegible] that [illegible] Sir [illegible] also [illegible] is not only [illegible] butter and spoil[illegible] sea [illegible] a week [illegible]

Portable soup [illegible] liberal supply [illegible] thought necessary [illegible] we were in places [illegible] them and with [illegible] purse and fresh [illegible] and wholesome [illegible] quantity of greens than they could [illegible]

Further [illegible] the surgeon found [illegible]

Amongst other [illegible] the room of [illegible] by the exchange.

Captain Cook [illegible] emphasizes the value of [illegible] animal and vegetable food [illegible] was frequently [illegible] adds that it was his first care [illegible] could be [illegible].

He ends his [illegible] to the [illegible] following words:

> These [illegible] under the care of [illegible] which the *Resolution* performed [illegible] of three years and [illegible] through all the climates from [illegible] south [illegible] by disease [illegible] and [illegible] admixture of [illegible] unfortunately [illegible] by a fall [illegible] only four.

Captain Cook [illegible] Fellow of the Royal Society [illegible] and in the same year was awarded the Copley Medal of the Society (a medal awarded annually [illegible] important discovery [illegible] science). Thus Captain Cook [illegible] practical method [illegible] and [illegible] method by the results [illegible] second and third [illegible] success he [illegible] the Copley Medal of the Royal Society.

Recent scientific [illegible] success of his [illegible] *kraut* [illegible] fresh supplies [illegible] and vegetable food.

Recent experimental [illegible] has demonstrated the value of germinating

Expression [illegible] *Journal*
[2] [illegible]
[3] [illegible] Journal of the Royal Army Medical Corps, August 1917 (Vol. [illegible] No. [illegible])

peas, beans and lentils in preventing scurvy and the great anti-scorbutic value of cabbage In the memorandum on Food and Scurvy issued by the 1918 War Committee of the Royal Society it is recommended that for the prevention of scurvy when fresh vegetables are not obtainable, one ounce of lemon juice served with sugar should be given daily and that cooked germinating peas, beans and lentils should form part of the daily ration (West Indian lime juice as ordinarily prepared is stated to be useless)

In the report on accessory food factors (vitamins), published by the MEDICAL RESEARCH COMMITTEE 1919 it is stated "There is, however, indirect evidence to be gleaned in the high esteem with which certain fermented liquors made from germinated seeds have been regarded for the prevention of scurvy Captain Cook was a great believer in the anti-scorbutic virtues of a fresh infusion of malt (sweet wort)"

In the *Philosophical Transactions of the Royal Society* are five papers contributed by Captain Cook (1) "Observation of an Eclipse of the Sun, August 5 1766, made at Newfoundland vol lvii (2) "Transit of Venus, 1769, vol lxi (3) "An account of the flowing of the tides in the South Seas," vol lxii (4) The method taken for preserving the health of the Crew of His Majesty's Ship the *Resolution*, during the late voyage round the World lxvi (5) "On the tides in the South Seas, lxvi

The character of a man who was the son of a labourer, who ran away to sea, and then by hard work, ability and devotion to duty, became the most distinguished Navigator of his time and a Fellow and Copley Medallist of the Royal Society is worthy of careful study In his remarks at the commencement of his record of his second voyage Captain Cook modestly tells us that his narrative is the production of a man who has not had the advantage of much school education, but who has been constantly at sea from his youth and though, with the assistance of a few good friends, he has passed through all the stations belonging to a seaman, from an apprentice boy in the coal trade to a post Captain in the Royal Navy, he has had no opportunity of cultivating letters But he hopes the public will consider him "as a plain man, zealously exerting himself in the service of his country and determined to give the best account he is able of his proceedings

Nevertheless his handwriting[1] was so beautiful that very few literary men will be able to write better, and his account of his voyages is more interesting and more valuable than the vast majority of literary works Captain King, his colleague and successor, in a concise appreciation of Captain Cook's character refers to his vigour of body and mind, his courage, and in spite of a warm temper "a disposition the most benevolent and humane", but he considers "that the most distinguishing feature of his character was his unremitting perseverance in the pursuit of his object

[1] In the Museum of the Royal United Service Institution Whitehall London may be seen a specimen of his writing also a facsimile of his writing is given in the Edition of his Voyages by T Barrow F R S

THE HEART AND THE ELECTROCARDIOGRAPH

By HORACE HILL, M.B., B.S., M.R.C.P.

The diagnosis and prognosis of all forms of heart disease has been profoundly modified by the electrocardiograph. The important question arises: "How far would the electrocardiograph help in the Service?" Before going any further it might be well to state that an electrocardiogram cannot lie. Neither in a large majority of cases does it offer any grounds for discussion. With this instrument black is black, and white is white. It is simply a question of reading what one sees on the electrocardiogram itself. Where the instrument is especially useful is in those cases which show no gross clinical signs or symptoms of defect, as, for instance, in early myocarditis. If the heart is affected in this way a gram will reveal it. There are some difficult points which an experienced opinion alone could decide, but these are exceptional. The instrument tells one quite clearly the essential points for diagnosis, and often a very definite prognosis as well. This instrument would reveal defective hearts in recruits and boys who at the time of entry had no clinical signs or symptoms of disease. The saving of expense in this one item alone would very soon pay for the cost of the instrument. While on the subject of recruits I have suggested in previous articles,[1] and repeat it again, that a boy should not be entered directly into the Service after one short physical examination, but should be on probation for six months before being finally accepted. In the same articles I have endeavoured to point out the danger of admitting recruits whose weights are small in proportion to their height. Light weight in boys may be associated with hidden tubercle or hidden myocarditis, both of which are expensive to the State. A rapid pulse is also associated with an affection of the myocardium or tubercle, and if the light weight is associated with a rapid pulse there is still greater reason for the rejection of the recruit.

The Principle of the Electrocardiograph

The currents of electricity generated in the body are of two kinds, continuous and alternating. Fortunately currents arising in the body are continuous except that of the heart which is diaphasic. The whole box of tricks of the electrocardiograph consists of mechanisms devised to neutralize all the continuous currents, in order that the diaphasic current generated in the heart may have free play on a finely drawn silver quartz or platinum fibre, rendered sensitive by being under tension in a powerful magnetic field. Behind this fibre is a light which throws the shadow of the fibre through a narrow slit in a diaphragm on to a slowly moving photographic

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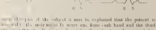
Read at Geneva

plate. As the fibre vibrates its movement is recorded on this plate and constitutes the electrocardiogram (see diagram).

This is a normal electrocardiogram. The essential points being the P or auricular wave caused by the contraction of the auricles and the contraction of the ventricles (which starts at Q and ends at the end of T), the waves Q R S and T being known as the ventricular complex. For the purposes of this paper Q and S will be ignored except to say that in some forms of cardiac disease the wave S is much deeper and accentuated in Lead III which is important. The actual practical details of neutralizing the continuous currents of the body and standardizing the fibre will also be omitted. The P—R interval is of vital importance, for it registers the time taken for the impulse to pass from the auricles to the ventricles. Normally it takes one tenth of a second. If it takes one fifth second [illegible] heart block is present. This early form of heart block, or grade I heart block, cannot be detected by any means other than the electrocardiograph. Its importance lies in the fact that, amongst other things, it is an early (often the earliest) sign of myocarditis. Hence the importance of this instrument in testing the hearts of recruits and patients. Before



leaving this part of the subject it may be explained that the patient is connected to the instrument by wires, one from each hand and the third from the left foot. By means of switches the patient can be connected to the instrument by his two hands only, whereby a transverse circuit is made through his heart. This is Lead I. Another switch connects only his right hand and left foot to the instrument and an oblique circuit is made through his heart (Lead II). A third switch connects only his left hand and left foot to the instrument, whereby a vertical circuit is made through his heart (Lead III). These three readings are taken separately and recorded one under the other on the same plate. The object of the three readings being that the slight variations in each caused by the [illegible] of the circuit may be reckoned in the final summing up of a [illegible]. As this paper only deals with the simpler cardiac defects only Lead I will be used.

Cardiac Irregularities

Sinus Arrhythmia.—The sino-auricular node, from which the impulses [illegible] the contraction of the heart originate, is under control of the [illegible]. The [illegible] in these cases is affected by the movements of respiration. [illegible] inspiration quickens the heart beat, expiration slows it. The electrocardiograph shows this very well if a tracing of the respiration is taken at

[illegible] but [illegible]ment is not necessary Tell the p[illegible]ent to h[illegible] his breath and the irregularity disappears

Ventricular Extra Systoles An extra systole means nothing more or less than this—the heart starts its contraction from the wrong end It must be an extraordinary heart that does this, and there must be something the matter with it in spite of what any one has said to the contrary When a muscle becomes fatigued, it first becomes irritable and so does the myocardium As soon as any part of the myocardium becomes more irritable than the sino auricular node it usurps the function of this node and the impulse for the contraction comes from this new point This extra systole is the result of an increase of irritability in the ventricle which means the beginning of fatigue That is why extra systoles appearing in a heart damaged by a lesion or a toxin are of bad import. For instance in pneumonia, if the heart is going at a rate of 120 and extra systoles appear, the outlook is not good Extra systoles appearing when the pulse is going at a high rate are unfortunate On the other hand in children when in bed and the heart is slowing down and the child is normal extra systoles sometimes appear The cause here is temporary and of little import But here again it is advisable to take an electro cardiogram, for if it shows a first grade heart block then the extra systole is significant Grade I heart block would indicate a myocarditis, and the presence of the extra systole would make the prognosis worse Similarly if an elderly man can take his usual exercise all day and is otherwise normal but has an attack of extra systoles when he is sitting down after dinner, and his heart is slowing it is not of much importance provided the electrocardiogram is otherwise normal But the attacks should not be ignored or lightly considered The electrocardiogram here again comes to one's assistance and shows at once whether an irregular beat is an extra systole or not Provided the impulse starts normally from the sino auricular node and travels along the usual paths, no matter how frequently or irregularly the heart is beating, the ventricular complex is *normal in shape* (See diagram) If on the other hand, the impulse starts from some point other than and more irritable than the sino auricular node and causes the ventricle to contract this is an extra systole and is *abnormal in shape* in the electrocardiogram Extra systoles coming separately are easy to diagnose The two rapid beats followed by a pause and then a big beat with the resumption of a regular pulse are well known but some conditions are more difficult An extra systole occurring early is usually too feeble or the heart too refractory to contract strongly enough to raise the valves In this instance the valves not being raised no pulse is formed and there is a dropped beat at the wrist but the beat may be heard by auscultation If the extra systole which does not raise the valves occurs after each normal beat the pulse at the wrist will be halved Therefore in all cases of a pulse of 36 or so at the wrist take the pulse at the apex by ausculta-tion and in this case it would be found to be 73 Extra systoles occurring

late are stronger and lift the valves and cause a pulse at the wrist. Therefore an extra systole of this type with its compensatory pause occurring after each normal beat would cause a *pulsus bigeminus* at the wrist and the pulse at the wrist would be at the same rate as at the apex. Similarly, if an extra systole occurs after each two normal beats a *pulsus trigeminus* would be found at the wrist. A constant succession of extra systoles is supposed to be the cause of paroxysmal tachycardia at about the rate of 120. Paroxysmal tachycardia over 120 is said to be due to auricular flutter. When an extra systole fails to reach the wrist a mistaken diagnosis of heart block may be made, unless the heart is auscultated at the same time, when the extra systole may be heard. With heart block the ventricle does not contract, therefore there is no beat at the wrist and nothing heard on auscultation. The electrocardiogram differentiates the two at once, for the abnormally shaped ventricular complex of the extra systole would be seen, whereas in heart block there would be a P or auricular wave not followed by any ventricular complex at all because the ventricle does not contract. Extra systoles may occur frequently and irregularly causing the pulse to be so irregular as to lead to the suspicion of auricular fibrillation. The electrocardiogram shows at once the difference, the chief points being that in auricular fibrillation the P waves are absent, while the ventricular complexes are normal in shape, but vary in size, spacing and voltage. In extra systoles the P waves are all there and the ventricular complex is abnormal in shape. Other forms and aspects of extra systoles are beyond the scope of this article.

Heart Block.—The first grade consists in a prolongation in the time taken for the impulse to pass from the auricle to the ventricle, and can only be detected by the electrocardiogram where the P—R interval is seen to be one fifth of a second or longer. The importance of this reading in early myocarditis has been pointed out elsewhere. Every P wave is followed by a ventricular contraction. The second grade consists in the occasional missing of a *ventricular* beat. The auricle contracts normally all the time, but the impulse sometimes never reaches the ventricle and that chamber does not contract. The intermission may occur after every second beat of the auricle, one cause of a slow beat at the wrist, about 36, or after every second beat of the auricle, one form of *pulsus bigeminus*, or after every third beat, one form of *pulsus trigeminus*. On the other hand the intermission may occur at irregular intervals. In these cases there is no sound at the heart and no beat at the wrist. The electrocardiogram reveals this at once. Another form of heart block is the complete variety. The auricles beat normally at their own rate as shown by the P waves in the gram, and the ventricles beat at their own separate rate, usually about 36, quite independently of one another. We have thus three conditions under which the wrist pulse may be 36, viz., partial heart block, complete heart block and extra systoles occurring after each normal beat which do not raise the valves. In some cases of heart block

the condition may [illegible] clinically demonstrated by [illegible] up the foot of the patient's bed and watching the pulsation in the [illegible] of the neck When the auricles [illegible] the pulsation may be seen in the [illegible] whereas there is no sound heard at the heart and no beat felt at the wrist

Pulsus Alternans.—For diagnosis an electrocardiogram or a wrist pulse tracing are usually necessary Clinically it is usually impossible to diagnose it by the finger but an indication of the presence of the condition may be obtained by taking the blood pressure As the pressure is released the big beats appear first regular slow, and at 36 to the minute As the pressure in the bag is released more and more the weak beats suddenly appear, and the pulse rate immediately becomes doubled It is well known that this form of irregularity is of sinister prognosis

Auricular Fibrillation.—Normally the impulse which causes the heart to contract starts at the irritable sino auricular node, passes *via* the muscle fibres of the auricles by an undetermined path to the auriculo ventricular node then down the bundle of His and thence to the right and left ventricles by the right and left main bundles which end in arborizations in the substance of the ventricular walls An important termination in the right ventricle are those fibres which supply the musculi papillares of the tricuspid valve When the auricles dilate the muscular fibres are separated further and further from one another until the impulse is unable to pass from one bundle of fibres to another The auricles then cease to contract as a whole, and the fibres take on an independent contraction the auricles being ballooned and stationary but quivering The thickest and strongest muscular fibres of the auricles are those around the mouths of the veins they lie circularly The contraction of these fibres sets up a circular movement the so-called circus movement which passes round and round the auricles By the time the impulse has passed around the auricles and arrived back at its point of origin the fibres at this point have recovered from their refractory period and again the circus movement is repeated Quinidine acts by prolonging the refractory period of these fibres so that on return of the impulse from its circular voyage it finds the fibres at its original starting point still refractory and the circus movement tends to be broken At the same time quinidine lessens the irritability of the auricular fibres and as soon as it gets less than the irritability of the sino auricular node this node comes into its own again resumes command and the normal rhythm of the heart returns When the auricles are in a state of auricular fibrillation they do not contract therefore there is no P wave in the electrocardiogram an easily demonstrable proof of the existence of this state In addition irregular impulses pass at odd moments from the auricles to the ventricles which cause the ventricles to beat with gross irregularity Each beat varies in time and strength, and the intervals between each beat constantly vary Strong beats follow short pauses and weak beats long pauses and vice versa Nor is any phase of this irregularity repeated This is shown very clearly in the electro

cardiogram In addition [illegible] the difference between this and [illegible] above) and also irregularity [illegible] in which there [illegible] P waves gal[illegible], as the auricles [illegible] as a whole Clinically a guess can be made at the [illegible] the gross irregularity of auricular fibrillation and that [illegible] by the fact that if the pulse rate is increased by exercise [illegible] atropine to about 120 the irregularity of extra systoles tend[illegible] disappear while that of auricular fibrillation increases When the [illegible] and the heart returns to its former rate the irregularity of extra systole[illegible] appears again while that of auricular fibrillation tends to lessen

Auricular Flutter—This can only [illegible] detected by the electrocardiogram in which is shown a multiplicity of P waves The onset is usually sudden, dyspnoea is present and the pulse rapid and usually regular The auricles contract at the rate of 320 per minute and the ventricles may be 160 (2 to 1 heart block) or just over 100 (3 to 1 heart block) or 80 (4 to 1 heart block) In the last condition auricular flutter is present with a normal heart-rate Impossible cases again to diagnose without the electrocardiogram are those cases in which the heart block varies from one moment to the other, 2 to 1 heart block one moment, the next 4 to 1 the next 3 to 1 and so on The rapid heart of auricular flutter goes at a fixed rate it is quite unaltered by lying down standing up pressure or exercise Rest in bed is no good as it does not alter the rate

Murmurs

The diastolic murmur of aortic regurgitation is often missed when it is there The presystolic murmur of mitral stenosis is often diagnosed when it is not there The mitral systolic at the apex is often called functional when it is organic and *vice versa*

Aortic Regurgitation The diastolic murmur is usually heard down the left side of the sternum or more rarely more over the heart towards the apex It may be heard over a fairly large area or only in one place about the size of the end of the stethoscope It may also be heard only when sitting up and leaning forward or when lying down or when standing up after effort It is elusive In spite of this from my experience I think that there are some human beings who cannot hear this murmur Their ears are not attuned, for of six students four will hear the murmur easily and the other two will confess to complete inability to do so Perhaps one of these two students will hear the murmur if the patient is made to sit up take one or two deep breaths and then hold his breath The physical signs are a diastolic murmur water hammer pulse exaggerated pulsation in the vessels capillary pulsation A high systolic blood pressure and a low diastolic is typical The systolic pressure in the leg is greater than that in the arm If the two approximate it means that failure is there There is also left ventricular hypertrophy A Duroziez's murmur,

[illegible] murmur [illegible] heard over the femoral artery is said to be pathognomonic of the [illegible]. Another diastolic murmur which is heard in the pulmonary [illegible] is [illegible] murmur [illegible] of pressure in the pulmonary [illegible] caused by mitral [illegible] also by chronic bronchitis [illegible] and [illegible] disease of the [illegible].

Mitral St[illegible] [illegible] interesting to follow the changes in the heart due to this lesion [illegible] faithfully the electrocardiogram reveals them. The [illegible] can be read on the [illegible] as clearly and as easily as [illegible]. The [illegible] so to speak, spells it out [illegible] mitral stenosis [illegible] much is firstly overworked [illegible] under. This is shown in the electrocardiogram by [illegible] big P wave. The [illegible] also takes longer to empty itself [illegible] shown by the fact that the [illegible] wave is not only big but loses its peak and becomes extended [illegible]. This enlargement of the left auricle causes it to [illegible] with the right auricle: they do not [illegible] together [illegible] faithfully recorded on the gram by the [illegible] wave being big and [illegible] now bifurcated. The right ventricle now begins to be involved [illegible] and it has to push harder and hypertrophies. The [illegible] for there is a typical reading of right sided preponderance. [illegible] is a typical electrocardiogram of mitral stenosis and it [illegible] large [illegible] and diagnose without even seeing the patient. If now the right main bundle conducting the impulse to the right ventricle becomes partially blocked as may happen, the gram reveals it [illegible] quite typically and unmistakably. It is on this reading that a dramatic prognosis is made. [illegible] if two cases of mitral stenosis with similar clinical symptoms are side by side, and one gives a gram reading of right bundle block, that [illegible] done, the end is near, a matter of months, whereas the other case may last for years. The story could be continued, but one has to pass on.

The presystolic murmur of mitral stenosis is unmistakable. The best illustration of it I ever heard is the word [illegible]. Rumble and roll the "r," increase the volume and sound as the [illegible] is rolled and finish the word with as loud and accentuated a [illegible] as possible. Often the rumble and accentuated first sound are so loud that one wonders that the valve or even the heart itself are not shaken to bits and the stethoscope dislodged from the chest. In early cases the character of the first sound is unmistakable, and if mitral stenosis is suspected put the patient to lie down, turn him on his left side and listen to the apex. This will bring out the murmur. With the presystolic murmur there will be a thrill at the apex, an accentuated pulmonary second sound, a history of bronchitis and hæmoptysis, an enlargement of the auricles shown by x rays, and a typical electrocardiogram. When auricular fibrillation occurs, the auricles do not contract and so the presystolic murmur disappears, its place being taken by a mid diastolic or a diastolic murmur at the apex. This change is due to the murmur receding from its presystolic position further and further into the diastolic

period as the pressure between the auricles and ventricles changes, due to the non-contraction, ballooning, and weakening of the auricles. The pulse of mitral stenosis is small, but firm. The only sound which is at all like a murmur of mitral stenosis is a Flint's murmur. This is a pre-systolic noise heard in some cases of aortic regurgitation. A Flint's murmur is not rough and crescendo; it is soft and blowing and does not end in a smacking first sound. The pulse is a purely aortic one. An electrocardiogram would show none of the characteristics of mitral stenosis. In mitral stenosis the apex beat is a "tapping" one on palpation. Mitral stenosis can be divided roughly into three stages. After rheumatic fever it simmers and is probably undiagnosable for three or four years except by the electrocardiogram. The next stage is the one of the pre-systolic murmur. The third stage is one in which auricular fibrillation is present, and the pre-systolic murmur becomes replaced by a mid-diastolic or diastolic murmur at the apex.

Aortic Stenosis.—This lesion is due to rheumatism and not syphilis. The characteristics are a systolic murmur, with maximum intensity at aortic area, exceedingly harsh and rasping in character and not blowing. It is conducted upwards and heard above the clavicle and in the vessels of the neck. A well marked systolic thrill is present. There is enlargement of the left ventricle downwards with an increased slowing of the out-thrust of the apex. The pulse is small and anacrotic. Characteristic also of the lesion is a diminution of the aortic second sound. The electrocardiogram shows a left-sided preponderance. If the conditions present do not fill this bill then it is not aortic stenosis. The cause then may be anaemia, cardio-pulmonary murmur, congenital heart disease, pressure on the aorta by a mediastinal tumour, mere roughening or stiffness of the valves, fusiform dilatation of the aorta just above the cusps, or aneurysm of the ascending aorta.

A Systolic Murmur at the Apex.—A murmur should always be listened [illegible] when the patient is standing up, sitting down, lying down on back, lying down on left side and after effort. A systolic murmur at the apex only heard when lying down is almost certainly functional. When a functional murmur is present the apex beat is normal in position; it is less forcible in character than usual, and is neither slapping, heaving nor tumultuous. The murmur is soft and blowing in character; it does not interfere with, alter or replace the first sound, but follows it. It is not conducted out as far as the mid-axillary line; neither is it heard at the angle of the scapula. It is a short murmur, and is liable to occur after exertion. The pulmonary second sound is not accentuated. There is no enlargement of the auricles shown by *x*-rays. The boy is growing, putting on weight and shows no mental deterioration. The electrocardiogram is normal. The response of the heart to effort is normal. An organic systolic murmur is harsh and replaces or interferes with the first sound; it is conducted further than the mid-axillary line, and is often heard at base of scapula. The apex beat is displaced outwards and is

forcible, slapping or tumultuous There may be pulsation in the epigastrium, or in the lower intercostal spaces on left side The pulmonary second sound is accentuated The auricles are enlarged by X rays, and the electrocardiogram is not normal The boy does not grow, is underweight and is mentally dull The response to effort is poor

Myocarditis—The detection of this condition is of importance in the examination of recruits especially boys The use of the electrocardiogram will reveal this condition before clinical signs are present It might show first-grade heart block or irregularities or right- or left-sided preponderance, &c, and any of these might occur together or separately If there are no murmurs exercise tolerance normal, the electrocardiogram normal, and the heart not enlarged or the auricles then the myocardium is normal In young people no value whatsoever can be attached to the answer "No" to the query "Have you ever had any joint pains?" for in the young acute rheumatic infection rarely produces joint troubles it attacks the heart and produces myocarditis and endocarditis Also in the young the damage done to the myocardium as revealed by a gram is far more extensive and serious than is revealed by the clinical signs even if there are any A former history of fever or recurrent attacks of tonsillitis are all important So are diphtheria influenza and congenital syphilis Growing pains chorea, urticaria erythema and night terrors are also significant Dyspnœa wasting and pallor are evidence of a gross lesion The investigation of dyspnœa is important In slight myocarditis shortness of breath palpitation, fatigue, and perhaps occasional precordial pain on exertion are likely to be present This information can usually be elicited by the question, "Are you fond of games and do you play them?" If the answer is "No" it will very likely be found that one or more of the above symptoms are present and their unpleasantness more than nullifies any enjoyment that can be got out of a game and so games are dropped

A heart with myocarditis starves the body, and a boy becomes small in height for his age light in weight for his height mentally dull and backward, his hair is dull and his eyes move sluggishly When examined he takes little interest in the proceedings He gives a history of avoiding effort, and is usually pale Myocarditis due to most causes tends to remain the same, but myocarditis following influenza differs, in that it tends to shift from one part of the myocardium to another At one time there may be extra systoles, at another partial heart block or at another auricular fibrillation Examination of the heart may yield little more than a "tick tack" rhythm a feeble slapping impulse and weak sounds, the first sound especially being weak and short X rays may show enlargement of the auricles and a boot shaped heart The temperature may be slightly raised, and if so it is extraordinarily persistent If the pulse rate is taken when the boy is lying down, it should not increase by more than fifteen beats a minute on standing up

Quinidine

Some precautions must be taken before giving quinidine in cases of auricular fibrillation (1) Heart failure should be absent Quinidine is apt to increase heart failure and neutralize the action of digitalis (2) The earlier the case the more successful is quinidine If auricular fibrillation has only been present for a day or two, the chances that quinidine will be successful are very good If present for weeks, chances are quite good for a month about an even chance, if present for years quinidine will probably not act (3) The fewer symptoms there are and the nearer the heart is to normal the better

If for instance the heart is much enlarged especially the left ventricle conditions are likely to be present which favor thrombosis and if this is present quinidine may dislodge a bit of clot and cause an embolism The danger of this is probably exaggerated (4) A patient showing emboli should not be given quinidine

Quinidine successfully alters the rhythm of auricular fibrillation in over 50 per cent of all cases Before quinidine is given the patient should have a course of digitalis for a little When quinidine is started the patient should be in bed, especially is this important when the change is likely to take place Begin with a dose of quinidine 5 gr once a day The patient may possibly get a slight headache The next day give two doses of 5 gr each the next day three doses of 5 gr each next day four doses of 5 gr each, and then 6 gr five times a day This is the full dose namely 30 gr in one day Continue this dose of 6 gr five times a day for three days and then stop quinidine altogether if there is no change in the rhythm If the rhythm is not changed in a week quinidine is very unlikely to act and it should not be continued Even if the normal rhythm does not occur the patient has had the benefit of the rest the treatment has been tried, and the doctor cannot be blamed for omitting it When the change to normal occurs it does so suddenly, then gradually reduce the quinidine The probability is that the patient will require a dose of 5 gr or two doses of 5 gr of quinidine every day for the rest of his life Some times toxic symptoms are caused headache, nausea and vomiting They soon pass off as quinidine is all excreted in about two hours

FOOD DEFICIENCY DISEASES ON ACTIVE SERVICE: THEIR CAUSATION, PREVALENCE, AND CONTROL

By Surgeon Lieutenant W. J. RANKINE, R.N.

The substance of this essay is formed by war experience, interviews with eminent medical men, a cruise in the South Seas, the reading of literature on the subject by various workers in research, but I have derived the major portion in the manner of Autolycus—from the ideas of other medical men, and put them into my own words of expression. Deficiency diseases of food can best be divided into several headings and each dealt with separately and briefly. Therefore my varieties will be six: (a) Scurvy, (b) Xerophthalmia, (c) Beri-beri, (d) Rickets, (e) Pellagra, (f) War Œdema, and in conclusion a summary with a prophylaxis and means of control to cover the now so-called food deficiency diseases.

Scurvy

This is the classical food-deficiency disease that has been known from the earliest times in prisons, besieged cities, old sailing days, and has been noted as due to monotonous diets of dry or over-cooked food when fresh food was excluded from the diet. The antiscorbutic vitamin called "water soluble C" by Kennedy is also soluble in alcohol; it is stable in alkaline solutions and to a small extent in acid solutions, but is thermo-labile, being destroyed by exposure to a temperature of 60° centigrade for two hours. It is contained in fresh foods only, and vegetables, juices, milk and meat lose a certain amount of their antiscorbutic properties in the process of cooking, canning, drying and salting, but not by refrigerating. The citrus fruits and juices are good antiscorbutics, as has been well proved by their use in the latter part of the old sailing days. Tomatoes do not lose their ordinary antiscorbutic value in usual methods of cooking. Sir A. E. Wright points out that the foodstuffs which enjoy a reputation for the prevention of scurvy all fall into the alkaline group. Harley and Jackson were of the opinion that scurvy was a form of ptomaine poisoning due to the eating of decomposed meat. This is obviously wrong from the results of Chick and Hume's experiments in 1917, where meat was excluded from the diet and scurvy produced. They showed that 3 c.c. of lime juice or 2.5 grm. of cabbage leaves were equivalent in antiscorbutic effect to 100 c.c. of fresh milk, and that peas, beans and lentils, if soaked in water for twenty-four hours at room temperature, increased their antiscorbutic properties five- or six-fold. Delf showed that there was less loss in cooking green vegetables at a high temperature for a short time than at a low temperature for a long time. Campbell in his

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research on canned food notes that 75 per cent of the anti ... value was lost in the process. The 11 445 cases in Mesopotamia between July and December among the Indian forces were definitely shown to be due to absence of fresh food since there were no cases among the British who ate the fresh horse flesh.

The main pathological change in this disease seems to be subperiosteal hæmorrhages and one of the earliest symptoms is œdema, starting usually in the upper eyelid with a spongy condition of the gums. The development of the disease seems to be favoured by mental depression, exposure to cold, fatigue and overcrowding. In Papua I saw several cases of scurvy among the natives whose diet is mainly rice and biscuit. The outstanding fact was the peculiarity of onset starting with an ulceration round the teeth which spread to the gums, inner surface of the cheek, tongue and if untreated resulted in the ulcer eating through the cheek; owing to extensive destruction the patient often died. All cases treated by a sweetened 10 per cent lime juice solution made rapid recoveries. Scurvy is always prevalent where fresh food is absent and can only be controlled by a supply of fresh food carefully cooked. In the case of inadequacy of fresh food the diet should be supported by bottled lemon or lime juice and tinned tomatoes, as an extra to a tinned diet.

Xerophthalmia or Keratomalacia

This condition was discovered by McCollum and Davis, who stated that it was due to the lack of Kennedy's fat-soluble "A" vitamin, which is found in milk and butter and is destroyed by heating to 70° centigrade for one hour. This substance is essential to growth and its absence leads to a profound breakdown in the eye structures. McCarrison includes also a disturbance of the endocrine glands especially the suprarenals. This condition is very pronounced in a case of specific fasting. The symptoms are those of ophthalmia, œdema of the eyelids and an augmented secretion in the eyes. The condition rapidly grows worse and in a few days the eyes cannot be opened. Ulcers form on the cornea and perforation occurs if untreated, but recovery is quick when the patient is put on a proper diet of fats (butter, egg yolk, cod liver oil, or fats from the glandular organs, liver, kidney and testicle) except vegetable fats which have no effect. This eye disease is very common in Japan and consequently one finds that chicken liver is a common article of dietary there. The cereal grains prevent this disease but in themselves are not a cure.

Beri beri

This deficiency disease has been studied and discussed more than any other, and Sir Patrick Manson in 1898 wrote a classical article on the subject, but Eijkman's experiments on birds with the three kinds of rice

[illegible] on the [illegible] and [illegible] that it was not an infectious [illegible]. He produced beri-beri in men by a rice diet in sixty [illegible] days, while Frazer and Stanton experimenting [illegible] in eighty five to one hundred and twenty days. [illegible] of the Palau Islands told me that they had produced beri-beri in the islanders in eighty to eighty five days and that in their opinion it was not an infectious disease.

The large part of the rice grain is composed of a starch core, then comes the aleurone, a thin layer containing the protein and fat constituents and externally the adherent layer or pericarp, which varies in colour from red to white, and contains the salts. The grain is covered by a husk which is always removed to render the rice suitable for food.

In the process of milling the husk, the pericarp and, to a certain extent the aleurone layer are rubbed off the grain; when the milling process is carried to the extent that but little remains except the starch core the rice is termed "polished" and contains less than 0·4 per cent phosphorus pentoxide. Beri-beri may be produced by the prolonged consumption of white rice as a staple food. The general opinion seems to be that the disease is due to lack of the original "vitamine" studied by Funk, but as there was no nitrogen in it as would be implied by the termination *amine*, Kennedy used an algebraic term and called it water soluble "B". This antineuritic substance is soluble in water and alcohol and is comparatively thermostable, not being destroyed until heated to 120 degrees centigrade for two hours. It is contained in all cereal grains, legume seeds, tubers, milk, eggs, glandular tissues of animals and leaves of plants, but it is well established that no muscle meat will prevent to any degree dietary deficiency disease. The former foods prevent the disease but if lacking in the neuritis-preventing factor are just as liable to produce beri-beri. In Eijkman's experiments on birds he fed one lot on paddy or unhulled rice, another on rice which was steamed before hulling and a third on polished rice. His results showed that the birds fed on polished rice were the only ones which developed the peripheral neuritis and resultant paralysis. He proved that the greater the ingestion of carbohydrates the more vitamins are necessary. These vitamins are destroyed in the over-sterilisation of canning. Starvation does not give rise to beri-beri in man by itself. Besides vitamin lack a second factor the consumption of carbohydrates, is necessary. This disease is prevalent in China, Indo-China, Straits Settlements, Dutch East Indies, Philippines, South Sea Isles and Japan. In the Russo-Japanese war there were over 200,000 cases recorded and in the Great War a few hundred cases were reported in Mesopotamia; these consisted of a polyneuritis with myocardial degeneration. Beri-beri soon clears up when the patient is put on a suitable diet of fresh food

liver and kidneys, etc.) Samples of rice containing not less than 0.4 per cent. phosphorus pentoxide do not give rise to beri-beri. One thing of note regarding the disease is that it seems to encircle the world latitudinally in a belt extending to twenty-five degrees on either side of the Equator.

Rickets

This disease is very uncommon in the services, but cases have been recorded, so I will give it a little space. Mellanby was the first to classify rickets as a food-deficiency disease. The experiments were on puppies which were given a diet lacking in fat-soluble "A" factor. Park and Shipley, on the other hand, showed that the problem was not so simple as Mellanby's conclusions would indicate, because experimenting on rats with a diet containing an abundance of fat-soluble "A," they were able to produce most of the symptoms of rickets. They also had the same results when the calcium in the diet was insufficient for the nutrition of the rat.

They proved that several factors in the diet were concerned in producing rickets. More recent experiments have shown that abundance of calcium and phosphate radicals in the diet and essential fats (butter and milk) are necessary for normal development and bone growth. In cases of rickets, cod liver oil has proved useful and also sunlight rays. To prevent this disease in infants, mothers, while nursing the child, should eat eggs, fresh milk and plenty of green vegetables, for example, lettuce, celery tops, turnips and cabbages.

Pellagra

The first observations on this disease were by Gaspar Casel of Spain in 1735, but the name was given to it by Frapolli in 1771; it means "rough skin." The disease is characterized by an erythematous rash, though there is probably no other disease which shows such a multiplicity of symptoms and such variations in them. This disease is more prevalent in late winter and early spring, and the trend of symptoms is towards mild neurasthenia in the winter, disturbances of the alimentary system in the spring, and (diagnostically most important) an eruption on the skin. The pellagrous eruption is characterized by striking, symmetrical, sharply delimited patches of erythema resembling sunburn on the backs of the hands and extending up the forearms, these being the most common sites. In about ten days this port wine-coloured rash fades and the skin desquamates in small scales. In another variety bullæ form in the rash previous to desquamation. Waring and Willets associated pellagra with poverty, at the same time pointing out that the protein diet was small while the cereal element was disproportionately large. They classified the symptoms as a classical eruption, weak and worn out condition,

vertigo and heartburn. The disease was very prevalent in southern Europe, Egypt, India, Straits Settlements and southern United States. There are approximately half a million cases of pellagra in the world per annum, but there is a tendency to a decrease in the incidence and virulence every year. Some believe that fæcal bacteria play a large part in the ætiology, and some believe that it is an infectious disease. It is noticeable in Egypt that those who live on millet instead of maize escape pellagra. It is well known that millet contains a large amount of fat-soluble 'A,' so this points to pellagra being a food deficiency disease. Goldberg and fifteen associates sought to transmit the disease to themselves by the injection of blood, naso-pharyngeal secretions, urine, fæces, and also scales from lesions in pellagrins. This experiment lasted for two months without results. It is also interesting to note that pellagrins even with deficiency of the antiscorbutic substance do not develop scurvy. Goldberg's most recent experiments of 1921 all go to show that pellagra is a disease due to restricted diet and not to maize or Indian corn as was originally believed.

Voegtlin in his experiments makes this quite clear, and found that on a diet of yolk of eggs, milk, fresh vegetables, and orange juice, pellagra cases made complete recovery in about three months, no matter how severe the cases were. Predisposing causes seem to be ankylostomiasis, alcoholism, malaria and disorders of the alimentary system.

War Œdema

There seems to be a close resemblance between this condition and wet beri-beri, because a lowering of the protein in rice-eating countries will cause the peripheral neuritis of beri-beri to be complicated with œdema and produce a wet form of the disease. Budzynski and Chelchowski described one hundred and ten cases in the war in Poland of "hunger swelling" due to lack of food. Digby describes cases in the Indian famine of 1876. Denton and Kohman experimented with rats and fed them on carrots only and found that they developed this œdema; they then added purified food substances and found no alteration in the rats' condition. Their final findings were that lack of protein and high water content gave a tendency to œdema. German doctors found that the œdema was more marked in the late war than in ordinary cases of starvation, so consumption of large amounts of water and of salt in tinned soups in the diet, plus hard work, must have been additional causes. The symptoms accompanying the œdema were marked muscular weakness and alimentary disturbances. There was a reduction in the number of red cells and a tendency to leukopenia. The cases showed marked emaciation after the dropsy—which usually began in the ankles—had disappeared. There was also a deficiency of fats in central Europe, so it was to be expected that ocular manifesta-

[illegible] would [illegible] the most [illegible] that [illegible] the richness of carbohydrates and lack of protein and fats in the [illegible]

Summary

The food deficiency diseases represent, therefore, extreme examples of malnutrition in which the most prominent error is absence of chemically uncharacterized factors which cause the various above noted diseases. Diets of poor quality, in which two or more factors fall below the optimum may fail to produce symptoms of malnutrition yet may so lower the body metabolism as to cause a condition to which the body would under better conditions of nutrition be immune. From the facts it seems that the life span fertility and infant mortality are very sensitive indexes to well being and are easily modified in a profound manner by relatively small alterations in the diet either for the better or the worse provided the diet is so constituted as to bring the body into a state of nutritional instability.

There can be no doubt that the use of cereal products has already passed the limit of safety and that to a certain extent this is being reflected in the state of health of millions of people in this world at the present time.

The prevalence of food deficiency disease in the past has been great, but there is no reason in these times if the diet is properly controlled, why it should not become rare. Energy should not be spent on treatment but on prophylaxis. The factors essential to proper nutrition are a mixture of proteins including protein a source of glucose (starch, cane sugar, malt sugar, milk sugar) and fat, nine minerals sodium potassium calcium magnesium chlorine, iodine phosphorus and iron in salts, also sulphur which must be furnished in the form of the amino acid cystine and four chemical substances of which we know nothing. In order to eliminate food deficiency disease on active service the exclusive use of canned foods should be avoided and full advantage should be taken of the preservation of fresh food by refrigeration. Peas beans and lentils ought to be germinated before cooking and fresh green vegetables should be cooked at a high temperature for a short time rather than at a low temperature for a long time.

Roast beef is to be preferred to boiled beef because in the cooking of the former only the outside is subjected to a temperature of 70 centigrade.

Bread should be made from whole wheat flour and rice must not be used containing less than 0.4 per cent phosphorus pentoxide. It should be remembered that the whiter the rice is the more deficient it is in antineuritic substances.

There must not be a richness of carbohydrates and lack of proteins and fats in the diets and it is essential to maintain the ratio with eggs and glandular organs.

Barley soup should be given at least once a week, so also should cod liver oil if fats are not available

A daily ration of an antiscorbutic is very important when fresh foods are limited It should also be remembered that excessive drills causing fatigue predispose to the onset of food-deficiency disease

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PROFESSIONAL OPPORTUNITIES OF THE SERVICE MEDICAL OFFICER[1]

By Surgeon Vice Admiral A GASKELL CB OBE FRCS DPH RN
Medical Director General of the Navy

I have chosen this subject as I wish to take every possible opportunity to combat the completely false idea that the Service medical officer's opportunities for professional work are severely limited

The mischief of this statement consists in the fact that it sounds so plausible It has done, and is doing, incalculable harm to the Medical Services of our fighting forces A large number of newly qualified keen young men with no knowledge of the Services accept this statement as true and consequently seek other careers Happily a few through family ties or otherwise know that the Services do offer magnificent professional opportunities to a keen young medical man and consequently enter them so that we have to day some of the best brains of the profession in the three fighting Services But we want more of these and for this reason I am to day reiterating facts which you already know well hoping that I shall gain your support in bringing more medical men of the right type into our Services

I appeal to you to denounce publicly the false statement that the professional opportunities of the Service medical officer are not good

I can, of course, speak with most authority on Naval life, but I am certain that life in the Army or Air Force gives a medical man equally fine professional opportunities The addresses on this subject by the late Sir William Leishman in 1925, and by Group Captain Cooper in 1926 will help to convince you better than any words from me

It is necessary first to indicate what are professional opportunities and then to outline briefly how many of these occur in the various careers open to the young medical man

I should define professional opportunities briefly as follows (1) Reading and study (2) Obtaining higher qualifications (3) Perfecting one's

[1] Presidential Address delivered at the Royal Society of Medicine (War Section) Reprinted by kind permission from *Proceedings of the Royal Society of Medicine* vol xxi No 1 November 1927

training, in meth[illegible] examination (4) Having access to good quantity and quality of clinical material (5) Specialist work e.g. laboratory work research work ophthalmology, anæsthetics, operative surgery, hygiene radiography, venereal diseases, &c. (6) Last and least, the amassing of wealth

(1) Broadly the great difference between the average career of the civilian medical man and the average career of the Service medical officer is that the civilian medical career is monotonous and often too full of mechanical routine to allow of much reading, research, or recording of experience, whereas the Service medical career is anything but monotonous, a term of service on board ship or in ordinary regimental service being followed by employment in a large hospital with a severity of hard work and high class surgery medicine, &c sufficient to satisfy the greatest glutton for hard work My own thirty four years in the Navy may be taken as a fair sample of what is open to any Service medical officer during that time I have had opportunities for the study and practice of every branch of our profession (except, of course, diseases of women) and I would emphasize not for any second rate mediocre practice but as good though necessarily not so continuous as that of most medical men in civil life The less strenuous periods afford opportunities of study and revision—opportunities so sadly lacking in such a life as that of the busy panel doctor During the more leisurely periods of service opportunity arises to meet civilian and Service medical men at home, in our Colonies and abroad where we can observe their methods their hospitals, and their patients, and learn not only what new ideas to adopt but also what mistakes to avoid During these less strenuous periods we have leisure to attend lectures and medical meetings at home and abroad opportunities only rarely available to the busy civilian practitioner

(2) In civil life once the young medical man is launched, he seldom has the time or means to prepare for higher qualifications In the Services, a large number of medical officers, while on full pay, are given the opportunity to take higher or specialist qualifications, thereby not only rendering themselves of more use to their Service but of higher market value should they leave the Service

(3) The civilian branch of our profession often looks to us for expert advice in medical matters in which we have special experience and facilities for observation Our examinations of recruits are fairly thorough but in the past have not been estimated of as high importance as they should have been Our most skilled and experienced medical officers should be employed on this duty so as to ensure that our Services should obtain only recruits of perfect health The records of our examinations should be as complete as possible so that the whole profession could make use of them in determining what improvements are necessary in the health of the population in order to prevent the rejections Here is a very important professional opportunity of real value The Service medical officer when

employed on these duties can lay himself out to perfect these examinations, and increase his skill in detecting rapidly and accurately the early stages of those diseased conditions which later may lead to invaliding or loss of service

Having accepted only those candidates who are in perfect health, it is our duty to *keep* them in perfect health

Preventive medicine hygiene, public health, call it what you may, should surely be the primary object of our profession But I fear the curative interest in disease seems to rank higher at present than the preventive This may be due possibly to the large amount of quackery and nonsense which have been introduced into the literature of public health The Service medical officer, backed as he is by the splendid discipline and regulations of our fighting Services has peculiarly fine opportunities for advancing the world's knowledge of the science of hygiene In the prevention of disease, one of the most important weapons we possess is *periodic medical examinations* These are necessarily difficult to arrange in civil life, but in the Services with tact and a display of genuine zeal for the good of the Service we can always obtain opportunities

Here is another professional opportunity and I venture to say that in the career of the average medical student and later in the practice of the civilian medical man there is far too little opportunity for perfecting knowledge of the physical signs of health The use of the stethoscope and of the many and various instruments for special examinations is of the greatest value to every medical man In the Services the zealous medical officer has unique opportunities during those periods in ship or regimental life which normally occur between periods of service in a large medical or other scientific establishment

(4) It might be imagined that in our large Service hospitals we may have quantity but not quality This is not actually the case. As our sources of supply are not only patients from the active list but also from the retired list, we have to deal with the diseases of boys adolescents adults and the aged Our task is often a much more exacting one than that of the medical man in a civil hospital We have to bring about a perfect condition of cure Our task is also often a much more satisfactory one as for obvious reasons we are able to keep our patients in hospital much longer than it is possible to do in a civil hospital The surgical operations we have to perform are not those extreme rarities such as occur occasionally in a large establishment like the Mayo Clinic but they are certainly major operations, such as those for perforated gastric and duodenal ulcers removal of prostates, calculi in kidneys and ureters, cholecystectomies &c to quote a few abdominal ones only That a circumcision is the crowning glory of our major surgery may be a humorous statement but our detractors would actually have the world believe it true In medicine, in pathology in every branch of specialist work, but

[illegible] material is not only [illegible]. We [illegible] have the [illegible] advantage of being able to [illegible] the [illegible] the after-history of our patients, an opportunity so greatly [illegible] but so seldom obtained by our civilian [illegible].

(5) Specialists are encouraged in the Services and opportunities are given to officers to take specialist degrees and qualifications. Having proved himself an expert in any speciality an officer is given his specialist work to do and he receives a specialist's allowance, but he is never allowed to lose sight of the fact that he is first and foremost an all-round medical [illegible]. Thus we prevent [illegible]. It is unnecessary for me to mention all the different specialist appointments which are now available in the Services but it will suffice to say that they are so numerous and varied that the really zealous and [illegible] medical man can never fear that the Services do not offer him [illegible] professional opportunities.

(6) The [illegible]. It is customary to consider this a sordid and [illegible] but no matter how keen and [illegible] one must earn money if one is not [illegible] with any [illegible].

Now the Service medical officer is not paid very highly. Periodically, [illegible] sit to consider the pay and allowances of the Services [illegible] the better the type of medical officer we obtain, the better [illegible] the pay. [illegible] people to prove their worth [illegible]. At present our pay (and in [illegible] which are in fact only deferred pay) [illegible] with that of the average civilian man. [illegible] can make £1 000 a year by the time [illegible] he has often to live in a crowded and expensive industrial [illegible] he has to do very uninteresting machine-like work; he has no time to [illegible] to the scientific and higher aspects of his profession and [illegible] to save sufficient money to provide himself with a [illegible]. Of course if he is a married man he is not separated from his [illegible] family as the Service medical officer occasionally is. It [illegible] seemed to me that one blessing of the Services is that we are [illegible] the State and are spared the unpleasant business of sending in bills [illegible] patients. It is often said that medicine is a very fine profession but [illegible] trade. In this the medical officer of the Services will [illegible]. We do not make fortunes but we have as a rule a happy and interesting life full of professional opportunities if we choose to seek them.

Undoubtedly all opportunities in life must largely depend on the man himself. The keen man makes his opportunities and he recognizes and seizes them when they occur. I cannot help thinking that those who cry loudest that there are no opportunities are those who are not really so desperately keen on hard work as they would like people to believe.

They belong either to that large [illegible] people who want to be spoon fed in their work and in [illegible] to that [illegible] class who are merely *poseurs*

Discussion

Lieutenant General Sir MATTHEW FELL said that the [illegible] of the reorganization of the R A M C after the South African War and the policy of concentration of Army patients in central hospitals both at home and abroad had been to increase the facilities for professional opportunities [illegible] the clinical side of medicine, surgery and pathology

Air Vice Marshal D MUNRO said that the professional opportunities in the Services were, in fact in many ways more varied than those offered in civil practice though not so extensive in certain directions [illegible] there was naturally in the Services not the same wealth of clinical material for the study and practice of certain professional subjects If the civil practitioners were at present ignorant of the amount and variety of professional work to be obtained in the Services they would soon be made aware of them through the medical officers at present serving What he was more afraid of was the impression that in the Services encouragement was not given to keen men to work at their [illegible] professional line When it became known that such encouragement was [illegible] and that advancement in the Service could be obtained by purely professional merit he thought that there would be no lack of good men coming into them

Surgeon Vice Admiral Sir JOSEPH CHAMBERS said that the only way to combat the erroneous opinion about the lack of opportunities in the Services was by an intensive propaganda scheme explaining the methods at present in existence and particularly emphasizing the opportunities now afforded in the Services for post graduate work

He (Sir Joseph) had been much impressed a few days previously by an editorial article in the *Post Graduate Medical Journal* stating that such facilities for post graduate work as are afforded by the medical services of the fighting forces must make many general practitioners envious of their brothers in the Services

Lieutenant Colonel T B LAYTON said that he had come to the meeting as a [illegible] clinician, who was also a teacher at one of the medical schools and young students sometimes came to him for advice as to entering the Services He would be very glad when anyone asked him in the future to recall the help that he had received from the President's paper He would like the President to put down under a separate heading one subject on which he had touched, namely the medical aspects of keeping well a number of young healthy individuals This was a subject of great importance about which at the present time the young medical man could learn practically nothing in civil life but he believed that medicine would rapidly develop along these lines in the near future and that those who were now preparing for qualification would have to deal with it in civil life to an extent which men now of middle age had never had to do He believed that it was only in the Services that young men could obtain this experience which was of the greatest educational value

He would also like to say a word about the filling in of documents He knew that this was generally considered a bar to going into the Services rather than a reason for it, but although they might have too much of it to do he did believe that the training which the young officer had in this work was distinctly an advantage He (the speaker) found it most difficult to get students working under him to fill in any document correctly They did not recognize that doing such a thing accurately was as important a part of medicine as making

a careful physical examination. In these days when practically every patient had to have some examination made in a laboratory or by a specialist, if a document was not filled in properly, the patient suffered because the proper examination was not made or the specialist did not appreciate the exact point upon which a report was needed.

THE USE OF PHYSICAL EXERCISES IN THE CORRECTION OF DEFORMITIES

By Surgeon Lieutenant Commander K. A. I. MACKENZIE, B.A., M.B., B.Ch., R.N.

In sea going and harbour ships and in naval establishments ashore, where only men are borne, one is not often called upon to deal with deformities. In the training establishments, however, where one is dealing with cadets or boys, as the case may be, medical officers are quite frequently brought into contact with mild cases of deformity of some nature. The treatment of these cases usually takes the form of physical exercises, which have to be devised and carried out to suit each individual case.

I only propose to deal with three groups of the more common deformities which may occur in boys who are otherwise perfectly fit and healthy. The numerous other deformities can safely be left for consideration in the textbook or the hospital, as they are not often met with in boys who have passed a strict medical examination before entering the Service, and they cannot usually be corrected by physical exercises.

These three groups are: (1) Deformities of the vertebral column. (2) Deformity of the arch of the foot, known as flat foot. (3) Deformity of the knee, known as knock knee or genu valgum.

Vertebral Column.—Before discussing the deformities which may occur in this structure, it is necessary first of all to consider the normal spine with its normal curves. The vertebræ of the spine are placed and arranged so as to display certain curves from before backwards. These are of course subject to very great variation according to the position of the trunk and the head, but assuming that the column is erect and the head so placed that the eyes are looking towards the horizon, the following curves may usually be made out: (a) a forward curve in the cervical region, which gradually merges with (b) a backward dorsal curve. This again becomes continuous with (c) a forward curve in the lumbar region, which ends more or less abruptly at the union of the fifth lumbar with the first sacral vertebra; (d) a backward curve of the sacrum, which makes the front of the sacrum face downwards as well as forwards.

Now of these four curves only two—the dorsal and sacral—exist before a child is born; the other two—the cervical and lumbar—only make their appearance after birth. The former is associated with extension and elevation of the head, whilst the latter is developed in connection with the assumption of the upright position of the body, so it only appears after

the child has begun to walk. Not infrequently, [illegible] I have [illegible] there is a slight lateral curvature [illegible], the convexity of the curve being usually directed to the right [illegible]. This may be due to a greater use being made of the muscles of the right arm, or may depend on the pressure exercised by the upper part of the thoracic aorta on the vertebræ of the thoracic region, thus causing a slight lateral displacement, together with a flattening of the side of the first five thoracic vertebræ as has been suggested by some authorities. If this curve is present there are usually slight compensatory curves above and below in the opposite direction.

At times abnormal conditions occur. *Kyphosis* which is an undue increase in the degree or in the extent of the normal backward concavity of the spine in the dorsal region. This occurs in certain diseases with which at present we are not concerned. Apart altogether from such pathological conditions it is of very frequent occurrence as a deformity which is at first purely the result of habit and posture but which, if neglected, becomes fixed. It is commonly known as round shoulders. Whilst such a condition is extremely common amongst growing children, and is mainly due to habit, there are certain accessory causes which must be recognised and corrected in individual cases such as sitting at too low a desk so that the child has to stoop, bad eyesight, or the clothing being too tight across the chest.

In young children there is often a complete inability to attain a correct upright attitude, owing apparently to imperfect control over the muscles. Therefore, although we must ascribe the deformity partly to muscular weakness and partly to lack of effort, an important element is the lack of education in muscular control. In older children this attitude becomes fixed, the lumbar curve becomes accentuated, the shoulders remain stiff and the chest expansion poor. Such a fixed deformity, besides being extremely unsightly, may influence the general health by its effect upon the lungs. The first point in the treatment of this condition is the removal of any accessory cause. When the eye defect has been corrected, a good sitting posture at the desk secured, and the suitability of the clothing ascertained, then the further treatment is in most cases purely by means of physical exercises.

Physical or gymnastic treatment for kyphosis has three aims: —

(1) To stretch the spine and the shoulders, so that there is no resistance to full extension of the spine and to full movements of the shoulder-blade at the shoulder-joint. These stretching movements include a considerable forcible expansion of the chest.

(2) To strengthen the erector spinæ and other spinal muscles by means of active extension movements.

(3) To improve the control of those muscles, which maintain an erect attitude.

Exercises of the heaving, of the dorsal, and in a lesser degree of the

Lateral group [illegible] physical [illegible] or [illegible] This [illegible] same [illegible] in which the [illegible] specially [illegible] degree the lateral group.

Scoliosis.—The second deformity of the vertebral column is lateral curvature or scoliosis by which is meant a habitual or fixed deviation of the spinal column or part of it to one side of the middle line. There are two conditions which must be clearly distinguished from one another:—

(*a*) A lateral curvature which has been assumed by an otherwise normal spine due to habit or posture. (*b*) A lateral curvature due to a change in the anatomical structure of the vertebral column due to some disease or other.

Here we are concerned only with the former condition, *i.e.*, the postural one. This is extremely common amongst growing children, and investigations at schools have shown that 16–25 per cent. of school-children habitually hold themselves wrongly. The postures most frequently assumed are naturally those which are apt to occur most commonly in a child's life, *e.g.*, standing on one foot, dropping one side of the body, using the right hand, &c. It is natural to ascribe these postural curves to the habitual attitudes assumed in the use of the right hand, and this is the generally accepted explanation of them. In some cases a special occupation may account for a special curve. In the treatment of this condition certain principles are involved:—

(1) The control of the muscles must be improved so that a correct attitude is obtained, firstly as the result of direction, and then by the patient's own unguided effort, and finally unconsciously and without effort.

(2) The spinal muscles and the muscles in general must be strengthened. Those which by their action correct the curve particularly require to be rendered stronger. These muscles, generally speaking, are those on the convex side of the curve.

The lateral group of exercises are the important ones for special use here.

FLAT FOOT.—This is the name given to a deformity due probably to a yielding of certain ligaments, whereby the arch of the foot is lost and the foot becomes more or less perfectly flat. The foot at the same time is turned out, and the outer border is often a little raised, so that the patient walks mainly upon the inner side of the foot. This deformity is met with in those who stand a great deal, and in boys whose feet grow quicker than the strength of their muscles and ligaments. It is the direct result of the yielding of the muscles which maintain the foot in a position of inversion, especially the tibialis anticus and posticus. It is only when these muscles become exhausted and yield that the ligaments are strained and elongated, for it may be accepted as a law that the normal strain at a joint falls on

the muscles, the [illegible] the extent of movements. As [illegible] ing and [illegible] become more quickly exhausted [illegible] walking [illegible] the standing posture the [illegible] in a condition of tonus whereas in walking [illegible] of action and rest. Thus, in those whose [illegible] prolonged periods of standing, the muscles which keep the foot [illegible] inverted become exhausted and gradually yield. Then the superincumbent weight of the body coming on to the ligaments supporting the arch, they gradually yield as well, so the arch becomes flattened and the foot over-extended and turned out.

Imprints of normal feet vary much in form. The general opinion is that the feet which come in contact with the ground at only two parts—at the heel behind and along the pad of the foot in front—are those most prone to break down (fig. [illegible]).

[illegible]

In flat foot [illegible] with the ground [illegible] the plantar pad and the outer margin of the [illegible], becomes partially or complete[illegible] degrees of flat-foot but I am [illegible] going to [illegible] as it is the main one where exercises play a large part in the treatment. This degree is a condition in which the arch is undoubtedly flattened but in which the patient can in tip toeing pull up this arch of the foot by means of his tibial muscles. In this condition, or at any rate when the patient has reached this condition from more advanced degrees, treatment by active exercises must be made use of. The inner side of the foot must also be supported by making the patient wear boots or shoes raised along the inner side of the sole and heel, and with the inner half of the gap between the sole and heel filled in.

Th[illegible] which [illegible] most useful [illegible] —

(i) *[illegible] — [illegible] lowers arms — [illegible]*

(ii) *Stand as before — [illegible] gradual knee [illegible] — knee stretch — [illegible]*

(iii) *Marching on the [illegible]*

(iv) *Stand as before [illegible] as far as possible [illegible] side of the feet — [illegible]*

(v) *Sitting [illegible] and [illegible] of the front part of the feet [illegible] inwards and [illegible]*

G[illegible] Valgum or K[illegible] This is a deformity in which the femur and the tibia form an [illegible] angle at the knee the angle opening outwards It is one of the [illegible] deformities both in childhood and in adolescence it is more frequent in boys than in girls and may be unilateral but is more often bilateral Knock-knee may arise soon after the child learns to stand and walk or at any time during growth, as a minor deformity It is found throughout childhood As a major deformity it occurs chiefly at the age of 2 to 5 when it is due to rickets or at the age of 12 to 15 when it is an adolescent deformity It is this latter type of a mild degree usually that is met with at times in the Service. Anatomically, genu valgum may be due to curvature of the shafts of the femur or tibia to abnormal obliquity of the articular extremities of those bones in relation to the direction of the shafts or to abnormal size of the internal condyle of the femur Curvature of the bones is commonly found in the rickety variety and obliquity of the femoral condyles in the adolescent variety Except when due to bending of the tibia the deformity disappears upon flexing the knee

A slight degree of knock knee is extremely common in childhood Normally when the malleoli are in contact, the fully extended knee should show a very narrow interval In a very large proportion of children this interval disappears and with the knees in contact it is impossible to get the malleoli to touch unless the knees are flexed. Such slight knock-knee may be safely left to correct itself with further growth A more severe deformity however particularly if it arises rapidly in early childhood, or at 12 to 14 years of age or so does not so tend to correct itself and will probably be permanent This is a serious matter because persistent knock-knee alters the strain upon the knee joint, throwing undue weight upon the internal lateral condyle and the internal lateral ligament while in later years it may render the joint more liable to the degenerative changes of osteo-arthritis

Expectant treatment is indicated in the slight cases just mentioned It may be supplemented as in the case of flat-foot, by increasing the thickness of the inner side of the sole of the boot, so as to throw more weight on to the outer side of the knee and by exercises in which the knee is forced outwards during flexion Such exercises are —

[illegible]

I [illegible] in some cases given the necessary [illegible] in others I have only referred to the partic[illegible]d to be used Suitable exercises in each individ[illegible] from the 'Royal Navy Handbook of Physical [illegible] vol I, which is in the possession of all [illegible] officers who are now well qualified to [illegible] exercises according to the wishes and instructions [illegible] under his guidance and supervision

—

SOME OBSCURE CASES OF PYREXIA

[illegible] RITCHIE M.B.

Cases [illegible] constitute one of the most difficult problems [illegible] the medical side of a hospital The type of case [illegible] in which apart from the fever and various ill-defined [illegible] physical signs of disease can be found sufficient [illegible] diagnosis Naturally such cases occur with greater frequency in foreign stations where the unknown underlying causes are so much more numerous and which are, perhaps, apt to be insufficiently considered in Home stations, especially when no history of a primary infection is available Certain classes of cases must be excluded from this category [illegible] cases of early pulmonary tubercle in which the presence of tubercle bacilli is only manifested after a long period of time and after repeated and careful bacteriological examinations cases of quiescent septic conditions or chronic focal sepsis such as may be found in the sphenoidal or other nasal sinuses cases of early subacute endocarditis, deep seated hepatic abscess and other even more obscure conditions. Many interesting cases of a similar nature were described by Sir Thomas Horder in a post graduate lecture in 1925

Four cases which seem to me to illustrate the difficulties involved have recently come within my knowledge, and form the basis of this short article, which is written with a view to emphasize the importance of a laboratory investigation in all obscure pyrexial states

Case 1.—This case occurred in a dental officer, aged 27 whilst serving on the Home Station For about three weeks before admission to hospital on February 28, 1937, he had suffered from slight headache a general feeling of lassitude, muscular soreness and stiffness attacks of shivering and sweating at night While under treatment for eight days before his admission to hospital, his temperature ranged from normal in the morning to 102° F in the evening, tongue was coated and bowels constipated A

trace of illness was present [illegible] [illegible] physical [illegible] could be found to account for the symptoms [illegible] discharged [illegible] hospital [illegible] of "pyrexia of [illegible] origin"

No previous history of illness was elicited except tonsillitis in 1926 He had been a prisoner of war in Germany in 1917-1918, but had kept in good health Since then he had not been abroad and had never visited Malta or the Mediterranean littoral He had been inoculated against the typhoid group about ten years ago After admission to hospital the symptoms and the pyrexia persisted but no physical signs of disease could be detected by clinical or x-ray examination The spleen was not enlarged or tender the lung fields were clear and there was no oral sepsis Cultures of the blood and urine remained sterile Widal test negative for the typhoid group A blood examination showed a white cell count of 7,700 with a significant increase of lymphocytes to 5? per cent Agglutination tests were then carried out against *Brucella melitensis* which was found to be agglutinated in dilution of 1 in 1,000 In spite of the fact that the organism could not be cultivated from the blood or urine this result which was repeated, together with the symptoms and the characteristic undulant type of pyrexia which followed—four distinct waves of decreasing severity occurring—was sufficient for a diagnosis of "undulant fever" to be made

The diagnosis having been established it was necessary to search for the source of infection but this was unsuccessful As the patient was a dental officer it was thought that he might have been accidentally infected from the saliva of one of his own patients A full investigation, however failed to discover any such possible carrier who had passed through his hands Serological tests were performed on all mess servants and other personnel with uniformly negative results No cheese or other articles of diet prepared from goat's milk or in other ways suspicious had been provided in the mess It is of course possible that the causative organism in this case might have been *Br abortus* Bang, and not *Br melitensis* Bruce but unfortunately it was not feasible to carry out differentiating tests at the time

Case 2—Occurred in a medical officer, aged [illegible]0 who first came under observation with symptoms similar to those of the first patient About the last week in May 1927, he began to suffer from chilliness rigors, and sweating, with severe occipital and frontal headache For about six weeks before being admitted to hospital as a patient he had been running an irregular nocturnal temperature, and complaining in addition to his other symptoms, of transient joint pains in both knees and considerable loss of weight Although there was only occasional slight cough and hardly any sputum, one was bound to consider the possibility of early pulmonary tubercle This was fortunately negatived by the complete absence of physical signs negative laboratory tests and radiographic examination The previous history threw no light on the subject Patient had not been abroad for about three and a half years nor had he suffered from any

diseases [illegible] malaria dysentery, or Malt[illegible] illness might have been a sequel X ray [illegible] the lung fields and [illegible] sinuses were clear [illegible] putting out of count the possibility of a *B*[illegible] of the urinary tract, a condition which is sometim[illegible] cause of irregular pyrexia without physical signs

In this case, again, blood examination established the diagnosis, first of all, a white count showed no leucocytosis the total number of white cells being in the region of 8 000—but there was a lymphocytosis of 55 per cent Malarial parasites were absent and the Widal test was negative to the typhoid group Agglutination tests were then carried out against *Br melitensis* of which the strain in my possession was agglutinated in a dilution of 1 in 1,000 In view of the difficulty of discovering a possible source of infection the diagnosis was, not unnaturally, received at first with some hesitation but the serological results were confirmed independently by other pathologists working with different strains of the organism Sir Percy Bassett-Smith who saw the patient in consultation fully confirmed the diagnosis clinically, and also bacteriologically with three different strains of *Br melitensis* He carried out absorption tests with this organism and with *Br abortus* and obtained agglutination up to a dilution of 1 in 2 000 with three of his strains of the former, and up to 1 in 1,000 with the latter *Br melitensis* completely absorbed the agglutinins which *Br abortus* only absorbed incompletely Unfortunately I was unable to obtain a culture of the organism from either the blood or the urine The illness lasted for several weeks after admission to hospital the temperature chart showing fever of definite undulant type For a short period the spleen was very slightly enlarged

In this case again the difficulty remained of deciding on the origin of the infection Could the disease possibly have been contracted from the former patient who had been under the care of this officer in the preceding April? I think it very improbable Could it have been contracted from drinking infected milk? This possibility was investigated by the Naval Health Officer, who failed to discover any cases of infective abortion among cows of the district and in any case the officer only took small quantities of milk in tea, &c Whatever it may have been, the moral is that we must bear in mind the possibility of a Brucella infection in our cases of pyrexia of unknown origin, even when there is no history which seems to have any bearing on the case.

Case 3—The next case of interest was that an R A F officer, aged 25 who returned from eleven months service in Egypt in November, 1926 While in Egypt he had had sandfly fever and also several attacks of severe diarrhœa, which were however apparently not of dysenteric origin The illness for which he came under observation began on June 13 1927 On landing from a flight, he experienced a severe shivering fit, with intense headache and aching pains in his legs He felt better next day but his temperature

[illegible] occurred at intervals of [illegible] June 26. On [illegible] pains [illegible] legs but no swelling of joints and a scattered papular [illegible] the [illegible] arms and legs. His temperature was 101·8 [illegible] There was [illegible] enlargement of the liver or spleen and no physical signs of disease could [illegible] discovered in the thorax or abdomen. For three weeks after admission there was an irregular pyrexia, the headache and pain and stiffness in the leg muscles persisted with occasional transient pains in the knee and ankle joints. Fresh outcrops of the eruption appeared at intervals of a day or two during the whole period of the illness. The majority of the lesions were on the arms and legs somewhat nodular in type, with definite thickening of the skin and in some cases tender to touch. Occasionally one appeared which seemed almost purpuric in character. A striking feature of the case was very intractable insomnia. For several days the patient could obtain no sleep at all in spite of numerous hypnotics including morphia. Now and then in addition to headache he complained of photophobia and lachrymation. The symptoms gradually cleared up the temperature fell to normal just over four weeks from onset and patient made an uninterrupted recovery.

The diagnosis was difficult. In view of the history of diarrhoea in Egypt, the possibility of hepatic abscess offered an explanation of the temperature, although it would not account for the other symptoms. Radiographic examination of the thorax and the nasal sinuses was only of use in excluding such conditions as subdiaphragmatic abscess and chronic sinusitis. Malarial infection was negatived by repeated blood examinations and agglutination tests for the typhoid and Brucella groups afforded no help. A blood count however revealed a leucocytosis of over 31 000 with 80 per cent of polymorphonuclears which fell to 12 000 by July 4. This seemed to indicate a possible blood infection and blood cultures were taken on June 28 and eleven days later. On both occasions a small Gram negative coccus grew in broth after four days incubation. It was thought at first to be a contamination but as the same organism was obtained on two different occasions further investigations were carried out. On agar its growth was very feeble. It was not agglutinated by the patient's serum. Morphologically and in its sugar reactions however it conformed to meningococcus. A subculture sent to the Lister Institute unfortunately died in the post. I came to the conclusion that the case was one of meningo or parameningococcaemia without meningitis. On referring to the scanty literature at my disposal I found that in the *Annales de Médecine* 1919, Ribierre, Hébert, and Block had described seven cases of meningococcal infection in three of which there was no meningitis at all, but which were characterized by fever of a malarial type a papulo nodular eruption and arthropathies. A lumbar puncture was not made in this case, and perhaps fortunately, for it seems possible that by this procedure the meninges might have been secondarily infected from the blood.

Case 2. Another interesting case is that of [illegible] inoculated against the typhoid group in January 19[illegible]. He was placed on the sick list on board a ship in the Mediterranean [illegible] months later with headache, anorexia, malaise, and rise of temperature to 103° F., and was discharged to hospital as a possible case of heat-stroke. While in hospital he passed through a severe attack of paratyphoid fever with typical symptoms and range of temperature. His blood-serum agglutinated *B. paratyphosus* A. in dilutions of 1 in 2,000, but unfortunately the organism could not be isolated from the blood or the excreta. Repeated examinations for malarial parasites yielded negative results. He was invalided home, but on the voyage suffered from a recrudescence of the pyrexia, and was re-admitted to hospital with a temperature of 100·2° F., and obviously ill. At this time no evidence of active infection with the typhoid or Brucella groups was found, but numerous "crescent" forms of the subtertian malarial parasite were demonstrated in the blood. Under appropriate treatment with quinine the patient made a rapid and complete recovery.

This last case affords a good illustration of the fact which one is perhaps apt to forget, that a person can suffer from more than one disease at the same time.

I am indebted to Surgeon Captain J. McCutcheon, Royal Navy, for his kind permission to record these cases.

Clinical Notes.

TWO CASES OF CLINICAL INTEREST.

By Surgeon Commander J. F. WOODHULL MINETT.

(1) Potassium Permanganate in Suppression of Urine.

The following case, which occurred during the war, whilst I was in charge of the Junior Surgical Division at the Royal Naval Hospital at Chatham, appears to me to be of some interest.

Temporary Surgeon E. H. Hogg was associated with me in the case and I am indebted to him for the notes and the details relative to it. I have never had occasion to try the treatment since, but I certainly should do so if the opportunity arose.

J. M., chief stoker, aged 50, invalided from Malta, was admitted to Royal Naval Hospital, Chatham, early in 1916 with difficulty in passing water. He was found to have a very much enlarged middle lobe in the prostate and also several urethral strictures.

Urine on examination was found to be normal: specific gravity 1016. Catheters had to be passed periodically for several weeks and a No. 7 Coudé was used. Later on sounds were passed without an anaesthetic and an attempt to pass a urethroscope failed. After the passage of the sounds, the same night he had a rigor. Temperature 104·5° F., pulse 130. The temperature then fell rapidly to 9[illegible] and collapse was marked, the pulse being almost imperceptible.

He [illegible] congestion o[illegible] Saline [illegible] and stimul[illegible] employed

A[illegible] complete suppression of urine, none being found after [illegible] Two days after the operation he commenced to vomit [illegible] showed the bladder to be quite empty The [illegible] with warm boric lotion and diuretics, &c , produced no [illegible]

I [illegible] by this time and certainly thought I was going to lose my pat[illegible] responded to no treatment and urine remained suppressed On the second night I recollected suddenly that I had heard a doctor out East [illegible] on that injections of potassium permanganate in a very weak solution subcutaneously had a wonderful effect in these cases, and I resolved as a last [illegible] to try this One c.c of a 1 per cent solution was injected at 10 40 p m and repeated at 1 40 a m The effect was magical He passed 2 oz of [illegible] one and a half hours after the first injection, 6 oz after the second and 14 oz later in the day The urine then became very copious as much as 100 o[illegible] being passed in a day This, however gradually decreased His other symptoms also cleared up and shortly afterwards he was fit to leave hospital

Whether the potassium permanganate was responsible I do not know and I have not seen this use of the drug mentioned in any book but the fact remains that the patient appeared to be dying from suppression of urine, and after the first injection of potassium permanganate urine began to be voided and general improvement commenced

(3) An Uncommon Dislocation

Dislocations of the wrist joint are comparatively rare, and a note of the following case may therefore be of interest

H D was admitted to the Royal Naval Hospital at Portland on May 13, 192[illegible] with a diagnosis of Colles fracture The injury was sustained during coal ship operations a hoist of coal weighing about a ton falling on a hatch cover which was open at an acute angle The hatch closed, grazing the man's upper arm as he pulled it way but jambing his forearm near the wrist between the hatch cover and the coaming Shock was marked and the diagnosis evident of dislocation of the wrist joint backwards and radially

There was steep swelling on the extensor aspect from tense synovitis, and the styloid process of the ulna was almost penetrating the skin The relations of the styloid processes were unchanged the carpus lying in a plane posterior to them There was no shortening of the forearm but shortening of the palm, all these points distinguishing the condition from a Colles fracture

X ray confirmed the diagnosis and showed the whole carpus dislocated backwards and radially and the styloid process of the ulna were also detached Reduction was easily obtained with traction on the hand and pressure behind the carpus Fixation of the wrist in slight dorsi flexion was employed, and the result was quite satisfactory movements being complete when he was discharged on June 29 1927

I have to thank Surgeon Commander M B Macleod R N for the notes on this case and for the x ray report

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A CASE OF HEAT STROKE COMBINED WITH MALARIA

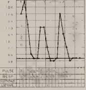
By Surgeon Lieutenant F. M. LLOYD STILL.

An interesting case occurred on board H.M.S. *Tarantula* where it was found that both clinical and laboratory methods revealed a case of combined heat-stroke and malaria.

The laboratory investigation showed subtertial malarial parasites with marked crescent formation. All stages of sporozoitation were evident at one and the same time. There was also a marked haemolysis which is present sometimes in either or both these conditions combined.

Clinical History

The patient was a naval rating, who reported sick at 5 p.m. on May 28, 1926, while the ship was at Canton, South China, complaining of dizziness and headache. He had been out in the motor boat all the afternoon and had worn his sun helmet all the time. His temperature was taken and was found to be 106° F. Ice was immediately applied to the head and neck, iced towels to the body and he was given ice to suck. In spite of these measures his temperature rose to 106.8° F. He was then placed in an ice bath and iced towels continued. After about half



an hour his temperature came down to 103.6° F., but his general condition became so bad that he was removed from the bath and placed in a bunk. His colour was very bad and he was almost pulseless. Ether and digitalis were given intravenously. His general condition was soon much improved, but the temperature again rose to 105° F. He was then again placed in the open air (7 p.m.) on a camp bed on a blanket rung out in ice water with blocks of ice down the spine and to the nape of the neck. Ice was renewed when necessary. Soon after this a storm broke and wind and rain undoubtedly helped to lower his temperature. He was on the battery deck and, as mentioned above, in the open air. At 10 p.m.

[illegible] F and the patient was shivering He was [illegible] between dry blankets and the temperature observed at frequent intervals The temperature rose slowly to 103 4° F and at [illegible] replaced to neck and blankets removed Temperature gradually dropped to normal At no time was there any unconsciousness, vomiting or feeling of nausea

The following meterological facts were obtained later

Temperature (maximum) 93°, (minimum) 65 Average for *May* mean maximum [illegible] mean minimum 72 7° Rainfall 9 58 in in thirteen days *Mean relative humidity* 6 a m 93 3 per cent 3 p m 79 9 per cent

The next day May 29 he passed a comfortable day Condition good but temperature in the evening rose to 103 [illegible] No distress and good pulse Ice was applied to neck and spine until temperature became normal Patient passed a comfortable night

May 30 1926 Condition very good and temperature normal until [illegible] p m when it rose suddenly to 10[illegible] Condition very bad, patient pulseless and heart sounds scarcely audible He was given an intravenous injection of digitalin immediately [illegible] as before Condition improved quickly and temperature fell [illegible] suddenly to 10[illegible] and later to 9[illegible] He was returned to warm blankets on account of shivering 7 p m temperature 103 [illegible] pulse good At [illegible] p m a blood smear was taken and stained and under the microscope revealed [illegible] and a few malarial parasites as described above in laboratory investigation Quinine bihydrochloride 10 gr was then injected intramuscularly

The condition of the patient next morning was good but owing to the possibility of a third attack I accompanied him down to the Royal Naval Hospital Hong Kong in the armed launch, *Faulkner* He remained well after this but did not return to the West River Flotilla

The almost diagnosis was in favour of heat exhaustion with the exception of a hyperpyrexia instead of a hypopyrexia Sunstroke could not be diagnosed as although he had all the common symptoms of such the cardinal symptom viz unconsciousness passing into coma was absent

There was no definite clinical evidence diagnostic of malaria The majority of physical signs weighed in the balance in favour of the heat hyperpyrexia of Manson or heat stroke

The temperature of course might be considered to be solely due to the malarial infection found on microscopic examination, but it seems highly improbable that a naval rating newly appointed to the Far East previously in very good health and with no history of malaria should as it were, suddenly develop the two conditions simultaneously

TREATMENT OF PERFORATED GASTRIC AND DUODENAL ULCER

By Surgeon Commander [illegible] WARREN O B E M B

The following sequence of perforated gastric and duodenal ulcers treated by operation are recorded because there still appears to be considerable difference of opinion as to the most satisfactory method of dealing with these cases

Gastal Sutherland, writing in the *Practitioner* March 1927 gives two principles on which all agree, *viz*, operation should be performed as soon as possible after perforation the rent must be closed With respect to almost everything else, he says divergent opinions prevail

Sutherland himself favours excision of the edges and closure of the ulcer, irrigation of the abdomen, and primary suture of the abdominal wall without drainage In addition he performs a Witzel s gastrostomy in front of the stomach

to prime [illegible] rostomy or resection of the [illegible] there are great obje[illegible]

His treatment [illegible] the exudate [illegible] most thorough[illegible] being washed out [illegible] solution of common salt. [illegible] abdomen is systematically [illegible] twice and excess of fluid [illegible] In most cases 10 litres of fluid are required.

The advantages claimed for gastrostomy are: (1) [illegible] avoids tension on the sutures; (2) it lessens the [illegible] of the patient in the hours after operation by preventing retching, and [illegible]; (3) immediately after the operation the patient [illegible] satisfy his desire to [illegible].

He gives a series of thirty one cases [illegible]. In the thirteen cases that are tabulated [illegible] drainage which [illegible] abandoned by the majority of surgeons was employed in all but one, and this patient, it may be noted, developed a right sided [illegible] pleurisy on the [illegible] day after operation. The mortality of these cases was nil.

1	W. A. W.	Misc.	[illegible]	[illegible]	[illegible]			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2	B. B.	S. P. D.	33	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Nil	
3	[illegible]	A. B.	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]		[illegible]		
4	E. B. F.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]			[illegible]		
5	[illegible]	[illegible]	[illegible]	[illegible]				[illegible]		[illegible]		
6	A. [illegible]	[illegible]	[illegible]	[illegible]								
7	W. W.	A. B.	41	[illegible]	[illegible]	[illegible]						
8	J. S. [illegible]	[illegible]	3[illegible]	[illegible]	[illegible]		[illegible]			[illegible]		
9	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]			[illegible]	[illegible]	
10	A. L.	[illegible]	31	[illegible]	[illegible]	[illegible]	[illegible]					
11	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]					[illegible]		
12	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]			[illegible]		
13	[illegible]	A. B.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				[illegible]	

The employment of [illegible] drainage [illegible] cases previously operated on for perforation at the [illegible] Naval Hospital, Chatham. Complications [illegible]. In one a boggy swelling developed [illegible] pus was evacuated and on the [illegible] day a [illegible] formed. In two pleurisy supervened on the [illegible] respectively; one of these was associated with [illegible] other case the wound gaped and a ventral hernia formed. Out of [illegible] died but in the rest no complications develop[illegible] to the

[illegible] with the abdomen were noted [illegible] were drained. One suffered from [illegible] and one showed signs of con[illegible]. All made good recoveries and were in no [illegible] which was usually inserted in the [illegible] wound [illegible] no undue difficulty in breathing or [illegible]

[illegible] of the abdomen [illegible] serous exudate was removed [illegible] swabs wrung [illegible] but there was no attempt at com[illegible] process. No [illegible] the partial cleansing.

[illegible] to the advantages claimed [illegible] for his method, it may [illegible] was no evidence of [illegible] on the sutures in this [illegible] very little [illegible] vomiting. Thirst was relieved [illegible] of glucose solution [illegible] by the mouth. Very [illegible] to follow simple [illegible] of the perforation with drainage, [illegible] showed any [illegible] hernia. In the foregoing [illegible] drawn [illegible] was rarely enough change [illegible] only was the frequency more [illegible] of [illegible] pain of comparatively short [illegible] and a high pulse [illegible] more suggestive of thoracic [illegible] in all there was a definite [illegible]

THREE INTERESTING SURGICAL CASES

[illegible] BRAITHWAITE

[illegible] aged 30 petty officer, R.N., was admitted to hospital on May 11, [illegible] the signs and symptoms of acute appendicitis. He gave a history [illegible] pain for three days. At the operation there was sero purulent fluid [illegible] cavity. The appendix was gangrenous, perforated, and adherent [illegible] and anterior abdominal wall. The appendix was removed and a [illegible]. The abdominal distension present prior to the operation per[illegible] began on the third and continued to the sixth day. Little or no [illegible] passed. On the eighth day some diarrhoea slightly and temporarily [illegible] the distension. The usual remedies, pituitrin, turpentine enemata, stupes, [illegible] without much benefit, and by the end of the month the patient's [illegible] critical. The abdomen was opened in the middle line. A small [illegible] of pus was found at the lower end of the old wound and numerous [illegible] between the omentum, caecum and pelvic colon, the latter being [illegible] and obstructed. In addition the entire gut was in a state of [illegible]. The adhesions were divided and a drainage tube left in a stab [illegible] the right iliac region. The result was very little real improvement, the [illegible] and flatus and faeces were only passed by the aid of a rectal tube. [illegible] day the distension, distress and exhaustion were so great that left [illegible] was done one evening under a local anaesthetic, as the patient lay [illegible] the ward. A Paul's tube was tied in. The immediate relief from the distension was followed by gradual improvement. The bowel drained freely and after a while faeces were passed per rectum. On the 65th day the colostomy was closed by excision of the fistulous portion and end to end anastomosis done. The patient made a complete recovery eventually, and was discharged to duty on the 106th day after admission.

Case 2.—M. D., aged 30, leading seaman. History of cystitis in 1918 for

which he was in hospital forty-two days. He had then [illegible] and bacilluria. Recurrence in 1923 in East Indies—thirty-nine days in hospital. Recurrence in March 1925, and this time there was obstruction of the urethra. He was sent to the Royal Naval Hospital Plymouth and his bladder was explored suprapubically and a papilloma removed in May 1925.

The suprapubic wound took a long time to heal and he returned to duty. In August, 1926, he reported sick at Malta with pain and tenderness in the suprapubic scar which was thickened. Urine normal. He was sent to the Royal Naval Hospital Malta, on August 12 1926. There was a hard tumour in the suprapubic scar and a few hard glands in the right groin. One gland was removed and showed no evidence of malignant infiltration microscopically. Cystoscopic examination showed both ureters patent and functioning well. A hen-sized papilloma was present in left upper part of bladder. Bladder held about 30 oz. The pain in the tumour increased and the scar broke down; a granulating mass was now protruding. He was invalided home on September 11 1926. On the passage home morphia was required for the pain. Cachexia became obvious, anorexia and vomiting set in. He was received into the Royal Naval Hospital Plymouth on September 29, 1926. On admission he was emaciated and weak, and had a poor appetite, occasional vomiting and obstinate constipation. Urine 1012, acid, containing a trace of albumin, numerous pus cells, a few red blood cells, no casts.

A tumour about three inches in diameter, roughly circular, occupied the suprapubic scar. It had a fungating surface which bled easily, and it did not appear to have any connection with the bladder or abdominal cavity. There was severe pain in and around the tumour. Temperature about 100° F. for the first week, thereafter subnormal. Pulse 70 to 100, tension low. The patient gradually grew weaker and died on October 18, 1926, perfectly conscious to the end. No signs of uraemia.

An autopsy was made. The following is an abbreviated report. Hard fibrotic growth in suprapubic scar. Peritoneum not invaded. No connection of growth to bladder or abdominal organs. Kidneys: *Right* 3½ oz., very small, red, fibrotic, capsule firmly adherent, a few scattered abscesses present. *Left* 11 oz., large, pelvis full of pus, numerous abscesses throughout kidney substance. Bladder contained purulent urine and a papillomatous growth. Microscopic examination of scar showed that the tumour was of the same type of cell as the bladder papilloma. No malignancy of glands or kidneys found on microscopic examination.

The main points of interest are: (1) The implantation growth in the scar, a very rare condition; (2) the severe disorganization of the kidneys without symptoms of uraemia.

The following case of osteosarcoma of the clavicle is sufficiently rare to justify publication.

Case 3.—A.H., aged 37, company quartermaster-sergeant. In January, 1925, he had his left shoulder trodden on whilst playing football. The clavicle was bruised. Swelling of the bone was noticed in January 1926; it increased very slowly till May, 1927, when it began to grow quickly enough to make the patient seek advice. He was sent to hospital for x-ray examination on June 14, 1927, when a skiagraph was taken and myelosarcoma diagnosed.

He was admitted to hospital on July 18. Three days later the clavicle was excised, its place being taken by a bone graft from the crest of the left tibia. Both wounds healed by first intention. Convalescence was interrupted by an attack of diphtheria.

Full movement and good strength of the limb has been obtained in spite of the graft having been fractured near its outer end.

The laboratory report on sections of the tumour states that it is an osteoid sarcoma. Clinically it appeared to be a genuine myeloma. There are no signs of malignancy at present.

[illegible] ophthalmic [illegible] difficulties present [illegible] want of [illegible] lighting conditions. In [illegible] of the eye a distance of [illegible] and the test types is necessary. If the [illegible] amount of accommodation which would [illegible] available for distance. If 6 metres can be [illegible] when necessary to compare results with [illegible] survey.

[illegible] space available in which [illegible] a small compartment [illegible] distance, use was made [illegible] *mirror is equal in size* [illegible] *the mirror as the object is* [illegible] means of a metal box [illegible] with clips to hold four [illegible] ordinary Snellen test types [illegible] reverse manner the [illegible] The box was then suspended [illegible] could be rotated on a [illegible] plane mirror 51 in. by [illegible] to the test type being 3 metres [illegible] the types [illegible] vertical plane. Adequate [illegible] fitted inside the box and [illegible] at the bottom. The fourth [illegible] except [illegible] at the lowest part [illegible]

[illegible] the patient's right [illegible] visible to him in the mirror [illegible] with Hering's apparatus for testing [illegible] the patient.

[illegible] to carry out four tests without moving [illegible] (2) colour vision, (3) tests for [illegible] A considerable saving of time is [illegible] the various instruments can [illegible] from the one position.

[illegible] fitted [illegible] of the room—the walls of [illegible] black [illegible] to avoid annoying reflection [illegible] made by covering an ordinary [illegible] black paint [illegible] a small circular aperture [illegible] for ophthalmic examinations. [illegible] hole table with a special [illegible] for the necessary clerical [illegible]

[illegible] has been found very con[illegible] and the whole under lock [illegible] compartment, the lighting conditions do not [illegible]

[illegible] Harvey of H.M.S. *[illegible] Duke* for very real [illegible]

A CASE OF KAHLER'S DISEASE

By [illegible] ANDER[illegible] HITCH[illegible]

[illegible] nothing particularly unusual about the [illegible] [illegible] nothing, as the disease is very rarely [illegible] the [illegible]

[illegible] aged [illegible]7 had suffered from pains [illegible] sides of [illegible] and legs for about four years. Intermittent [illegible] the pains gradually became more frequent until in 1936 they were almost continuous. In July and August of that year she went to a nursing home [illegible] two or three weeks under the care of a well known physician who [illegible] diagnosed the case as one of [illegible]. However she derived no benefit [illegible] and so gradually getting worse struggled on till March 7 [illegible] when she was quite unable to continue her work and was admitted to [illegible]. On admission she complained of pain [illegible] the muscles of the back [illegible] chest and to a less extent in those of the thighs and [illegible]. She [illegible] and stated that she had been losing weight rapidly. [illegible] was that she slept indifferently. A careful clinical examination [illegible] no physical signs to account for the symptoms [illegible] infection. There was no pyrexia. A small [illegible] swelling [illegible] noticed below and in front of the styloid process [illegible]. There was also a definite deformity [illegible] cartilage. A provisional diagnosis of [illegible] salicylate mixture prescribed.

The laboratory then came into [illegible] large quantities of Bence Jones protein. This [illegible] pathognomonic of multiple myelomatosis or [illegible] disease [illegible] substance has been reported in the urine of certain cases of chronic [illegible] leukaemia, of lympho sarcoma of the large intestine, and very rarely [illegible] deposits of malignant disease it was necessary to confirm the diagnosis [illegible] investigations. The leukaemias were dismissed [illegible] examination of the blood. Apart from the severe anaemia—the red cell count was 2,160,000 [illegible] constant feature of the disease, there were no pathological features [illegible] exception of a slight degree of aniso- and poikilocytosis. The diagnosis was finally clinched by X-ray examination which showed a general condition of rarefaction of the scapulae, clavicles, ribs and vertebrae, [illegible] of the [illegible] and 10th dorsal vertebrae with convexity to the right, complete loss of bone shadow of the first left rib and the anterior half of the first right rib from the angle to the head. The patient gradually became more feeble, and left the hospital on May 18 1937, dying a few days later. During the whole time [illegible] was under treatment the Bence Jones proteinuria persisted. The excretion of chlorides and urea was not abnormal.

Although uncommon, Kahler's disease is quite well known. The pathological condition is one of overgrowth of the haemopoietic tissue of the bone marrow, the process affecting all or nearly all of the bones of the body almost simultaneously. As the new growth extends, the hard bone becomes weakened and thinned, causing spontaneous fractures or bending of the bones, and as would be expected, severe anaemia from the destruction of the blood forming elements of the marrow. As a rule the course of the disease is a slow one, though a few cases with rapid onset have been reported. Death may occur from compression of vital organs by the crumpling up of the sternum or spine, and from the severe anaemia. No treatment apart from mechanical support of the weakened bones has been successful, that usually adopted being the administration of arsenicals and the use of the X rays.

The laboratory test for the presence of the Bence Jones protein is a simple

[illegible] heated preferably [illegible] rature as 40° C. [illegible] that precipitate [illegible] At boil[illegible] precipitate re-dissolves [illegible] is cooled. Certain [illegible] from the [illegible] the bronchial [illegible] from the [illegible] and the saliva. With regard [illegible] constitution of this substance [illegible] is still in dispute in spite of [illegible] amount of [illegible] subject. Differing from all other [illegible] not only [illegible] but also in the distribution of [illegible] it was [illegible] thought to be an albumose because of its [illegible] to heat. [illegible] usually considered to be more probably a protein resembling [illegible] blood. If this view is correct, [illegible] so freely and in such large [illegible] proteins of the blood. Several [illegible] have described [illegible] exhibited by this substance, the [illegible] as a foreign protein.

[illegible] for permission to publish [illegible] of this case.

A CASE OF PNEUMOCOCCAL MENINGITIS

[illegible] T. W. [illegible] O.B.E. [illegible]

[illegible] was admitted to R.N. Hospital, Chatham, March 9, 1927, with [illegible]. He was quite well up till 4.45 p.m. on March 8. At 6 p.m. [illegible] found by another boy, with whom he had arranged to go out [illegible] too ill to stand. He complained of sickness and headache. The [illegible] stated that he was groaning all night. Between 6 a.m. and [illegible] was observed by the sentry going backward and forward [illegible] and looking very ill. On admission to hospital tempera[illegible] pulse 116, respiration 34; he was very collapsed, cyanosis was [illegible] almost imperceptible and he was in a comatose condi[illegible]. No abnormal signs were discovered in heart or [illegible] abdominal tenderness and knee jerks were very brisk. At [illegible] 103 [illegible] pulse 130, respiration 30, colour much improved, [illegible] examination. No Kernig, no retraction of head, [illegible] and vomiting occurred during the afternoon. Previous [illegible] 1920, scarlet fever 1924.

[illegible] 10.—Temperature 101 [illegible] pulse 108, respiration 28. Patient remains [illegible] condition. Catheter passed and [illegible] of urine withdrawn. Examina[illegible] showed a cloud of albumin [illegible] per cent. Evening temperature [illegible] pulse 130, respiration 30. Bowels open. Had incontinence of urine and [illegible] the day. No retraction of head.

[illegible] 11.—Temperature 101.6° F., pulse 108, respiration 28. Bowels open [illegible] be roused; retraction of head present; moaning and crying continually [illegible] he is irritable and pulls at the bed clothes. A lumbar puncture was [illegible] under chloroform and ether when 40 c.c. turbid fluid under pressure [illegible] and 30 c.c. antimeningococcal serum given intrathecally. Evening [illegible] 100° F., pulse 104, respiration 26. Quieter during the day, but [illegible] singing at intervals; head retracted; pulse weak. Cerebro-spinal fluid [illegible] 11,000 cells per c.mm. (80 per cent polymorphs); sugar 0.01 per cent [illegible] positive. Pneumococci isolated on culture. A few pneumococci [illegible] blood culture. Blood urea content 72 mg. per 100 c.c. Non[illegible]

March 12.—Temperature [illegible], pulse 72, respiration [illegible]. Had a bad night, head retraction and meningeal cry very marked. [illegible] consciousness. Lumbar puncture performed and 30 c.c. turbid fluid [illegible] under pressure, 10 c.c. antipneumococcal serum being administered intrathecally. Evening temperature 102.6° F., pulse 108, respiration 36. Is irrational at times and complains of severe headache. Rigidity of head, neck and back more marked.

March 13.—Temperature 100° F., pulse 80, respiration 30. Had a fairly good night, more rational, rigidity less marked. Kernig and Babinski signs present. Lumbar puncture repeated, 15 c.c. fluid removed and 10 c.c. antipneumococcal serum given intrathecally. Evening temperature 101° F., pulse 72, respiration [illegible]. Bowels open. Quite conscious and rational; complains of severe headache; pulse good.

March 14.—Temperature 99° F., pulse 80. Had a good night; headache less and head less retracted. Cerebro-spinal fluid less turbid and not under pressure. Antipneumococcal serum (10 c.c.) given intrathecally, and 10 c.c. intravenously. Evening temperature 100° F., pulse 72, respiration 22. Comfortable all day.

March 15.—Temperature 97.4° F., pulse 80, respiration 22. Had a very poor night. Antipneumococcal serum (20 c.c.) given intravenously. Urine 1030. Acid, no albumin, no sugar. Evening temperature 98.2° F., pulse 73, respiration 20.

March 16.—Temperature 97.6° F., pulse 80, respiration 20. Had a good night, much improved. Antipneumococcal serum (20 c.c.) repeated intravenously.

From now onwards he continued to make good progress and no further serum was given. On March 28 he developed a systolic murmur at mitral area with extra systoles. On April 6 he developed acute appendicitis for which he underwent operation and the appendix was removed. He made an uninterrupted recovery.

Preparations, &c.

WELLCOME CONCENTRATED DIPHTHERIA ANTITOXIN 2,000 UNITS IN 1 c.c.

The chief obstacle in the way of administering large doses of antitoxic sera lies in the difficulties and inconvenience attending subcutaneous injection of such a comparatively large volume of fluid as that in which the required dose of antitoxin is contained.

During recent years, however, methods have been devised and developed which make it possible to separate the antitoxin-bearing fraction of the serum from those proteins which, while adding to the bulk of the preparation, are devoid of antitoxic value. The fraction of the serum removed in the process of concentration is probably at least equally responsible with the antitoxin-bearing proteins for those incidental toxic symptoms which sera may produce in susceptible patients. With concentrated diphtheria antitoxin it is found in practice that rashes and other undesirable symptoms occur very much less frequently than with untreated serum and that when such effects do occur they are of a milder type.

For many years the Wellcome Physiological Research Laboratories have produced Diphtheria Antitoxin of a concentration of 1,000 units in 1 c.c. or less. They are now preparing "Wellcome" Concentrated Diphtheria Antitoxin containing 2,000 units in 1 c.c. It is issued by Burroughs Wellcome and Co. in phials containing 5 c.c.

Reviews

[illegible] OF VARICOSE VEINS. [illegible] M.R.C.S. [illegible] First Edition. London: H. K. Lewis and Co. [illegible] Pp. 81. [illegible]

[illegible] little volume admirably deals with the subject of the [illegible] veins by injection. The details of the technique, the advantages, disadvantages of the various solutions used and the [illegible] are lucidly [illegible] As no unsightly scarring results, this [illegible] ought to appeal [illegible] The book is concise, practical and [illegible] many interesting [illegible] facts, and well deserves reading by all those who are interested in the [illegible] of varicosity. T. W. M.

[illegible] OF THE HAND. By Lionel R. [illegible] F.R.C.S. Eng., Surgical [illegible] and First Assistant and Demonstrator of Anatomy, London Hospital; late Demonstrator of Minor Surgery, London Hospital. London: H. K. Lewis and Co., Ltd. 1926. Pp. 193 + xi, with two coloured plates and other illustrations.

[illegible] of the hand [illegible], but do not always receive the utmost care and [illegible] from the surgeon who is called upon to treat them. Faulty diagnosis [illegible] treatment may be followed by a crippling deformity, loss of a limb [illegible] of life. Mr. [illegible] in the preface lays stress on the need for a [illegible] and simple book for students, house surgeons and practitioners on [illegible] of the hand, which are very common, present peculiar difficulties [illegible] of the intricate anatomy of this region) are often neglected until irre[illegible] damage is done, and are inadequately dealt with in the textbooks of [illegible]. With the gist of that statement we agree, but whether a simpler [illegible] has been written is open to doubt.

The opening chapter on anatomy confirms our suspicions. It is freely [illegible] that a clear and concise description of the synovial sheaths and cellular [illegible] spaces of the hand and wrist is a difficult problem. The author has made [illegible] study of this matter so that the material facts are both accurate and [illegible]. In our opinion, however, he has failed to convey these facts clearly [illegible]. For example, we may quote a paragraph from p. 41: "In [illegible] with the synovial bursae of the palm it is interesting to observe (1) That there is often an intermediate sheath between the ulnar and radial bursae (for the index tendons), and that sometimes it communicates with the ulnar bursa, sometimes with both ulnar and radial bursae, and sometimes with the synovial sheath of the index finger. (2) that the synovial membranes of the ring, middle and index fingers (if no intermediate sheath be present) are continuous with that of the ulnar bursa, but that with the occasional exception of the ring finger the cavities of these sheaths do not communicate with that of the ulnar bursa." We consider that many students would find such a passage difficult to digest. Infections of the fingers and the complications of whitlow receive the care and attention which they so richly deserve. Palmar infections and their complications are given ample consideration. *Kanavel's* method of draining *Parona's* space is particularly well done. Throughout the book many practical hints are set forth, and these are not to be found in the general textbooks on surgery. The volume as a whole contains excellent material which has been collected largely from the author's ripe experience. From this aspect we see nothing but good. Unfortunately many of the simpler rules of English grammar have been disregarded, so that the entire character of the book has suffered. We hope that this grave fault may be removed in future editions. Mr. Sewell's admirable

illustrations together with Mr Fisher's excellent radiograms are all that the most fastidious could desire. The scale diagrams however offer a sharp contrast; they hardly deserve a place in the student's textbook. Except for one or two printer's errors the book is well printed and strongly bound.

H. E. R. S.

A SHORTER SURGERY. A PRACTICAL MANUAL FOR SENIOR STUDENTS. By R. J. McNeill Love, M.B., M.S. Lond., F.R.C.S. Eng., First Surgical Assistant, London Hospital. London: H. K. Lewis and Co. Ltd. 1936. Pp. 399 + xiii, with 43 illustrations, including 13 plates. Price 12s. 6d.

The contents of this book may be fairly described as consisting of the notes of a successful tutor. These notes have been amplified, classified and divided into twenty-five chapters. After the surgery of tumours, bones, joints, deformities and the nerves have been presented in a somewhat concentrated form, important surgical lessons arranged in regional sequence follow. The technical details of the operations described contain many useful hints which could only come from the pen of a practical surgeon with considerable experience. There are no pretensions to style in the writing. In fact there is evidence to show that the subject matter has been hastily compiled and rushed into print. For instance, essential headline has been omitted in Chapter XVIII under Colon. The opening sentence reads thus: "This condition usually occurs in one or two more or less distinct forms", but we are left to discover for ourselves the condition the author is describing.

In our opinion the title is an unfortunate one as there is no such thing as a shorter surgery. "Extracts from Surgery" which contain the path of certain sections commonly met with in examinations for the higher degrees more aptly describes the nature of the book. From this aspect the senior student will view it with satisfaction and derive considerable benefit therefrom.

The illustrations are excellent, especially the radiograms and pathological specimens. Among the latter we are delighted to renew our acquaintance with many old friends introduced to us in days gone by through the courtesy of Mr Russell Howard.

On the whole we must confess to being a trifle disappointed with the book which does not truthfully reflect that high standard of scholarship and teaching by which the author is justly recognized.

H. E. R. S.

INTRA-CRANIAL TUMOURS AND SOME ERRORS IN THEIR DIAGNOSIS. By Sir James Purves-Stewart, K.C.M.G., C.B., M.D. Edin., F.R.C.P., Senior Physician to Westminster Hospital, Physician to the Royal National Orthopaedic Hospital, &c. First Edition. London: Humphrey Milford, Oxford University Press. 1937. Pp. 208 + 13. 51 illustrations. Price 12s. 6d. net.

In this volume is embodied the substance of the Presidential Lecture given by the author in 1926 at the Neurological Section of the Royal Society of Medicine. It is neatly arranged and very clearly illustrated. The cases are recorded with a wealth of accurate detail and with that methodical lucidity which characterises all the author's written works. The manner in which he arranges his cases in summaries, with all the salient points clear cut and all else in its due mead of light and shade, is a model for each one of us to emulate. It is a commonplace remark that we learn more from the bitter experience of our errors than in any other way, but here we have the mistakes of a master clinician at our disposal. Moreover, by way of contrast to these, the author is good enough to record the arguments that led in a series of his cases to a sound diagnosis. Altogether Sir James Purves-Stewart has 293 cases with full clinical notes pointing to a diagnosis of intracranial tumour. But he has wisely limited the basis of his theme to the

[illegible] whose anatomical situation was [illegible] by operation [illegible] would commend Chapter [illegible] on signs of [illegible] and their localization to all students of neurology. [illegible] a series of chapters [illegible] of the frontal, parietal [illegible] of the cerebellum [illegible] oblongata [illegible] growths in [illegible] pons and [illegible] and pituitary body, ventricular [illegible] tumours of the meninges, multiple tumours of the [illegible] these we are told first the number of cases and the [illegible] the numbers localized successfully and the number of [illegible] or not determined during life. Then come a few [illegible] of the different kinds of tumours in the various [illegible] followed by records in the form of masterly summaries of [illegible] signs, symptoms, and histories lead us on [illegible] even as we read, and then comes an account [illegible] diagnosis was erroneous, with reflections on the why [illegible] and the reviewer can conceive no method of instruc[illegible] student. The book is not long, but the number of [illegible] very varied, and each single case requires careful [illegible] his full reward. The last three chapters must [illegible] before. They are entitled "Gross errors in [illegible] in Diagnosis", and [illegible] Avoidable and Un[illegible] chapters written after the event full of wise reflections for [illegible] cases as a whole and they themselves are adorned [illegible] The remarks which open the first of these three [illegible] the intellectual honesty of their author. In dealing with [illegible] Diagnosis, he says: "This is a category of which every honest [illegible] keep a record. Many authors dignify such cases by the name of [illegible] *Cerebri*. But it would be more accurate though humbling to [illegible] to record them frankly as errors in diagnosis." He then [illegible] his own gross errors and to define the slippery path that led [illegible] Of all recent publications on a subject of such complexity [illegible] as this of morbid intracranial conditions Sir James [illegible] book is commended as *facile princeps*. The effort to follow it is [illegible] pleasurable to the mind of the student as the matter absorbed [illegible] to his diagnostic success.

J. G. D.

[illegible] ITS PREVENTION, SYMPTOMS AND TREATMENT. By H. [illegible] Bayly, M.C., Hon. Secretary, Society for the Prevention of [illegible] Disease, late Surgeon R.N. (Temp.), Major R.A.M.C. (T.F.), [illegible] to the London Lock Hospitals, &c. Third Edition. London: [illegible] the Press, Faber and Gwyer, Ltd. 1927. With 3 coloured plates [illegible] illustrations. Price 10s. 6d. net.

[illegible] edition of Mr. Wansey Bayly's book contains three coloured plates [illegible] and some additional paragraphs dealing with diathermy [illegible] contraception. The author admits that the small size of his [illegible] description of venereal diseases, and that the book is in fact [illegible] personal experiences and publications.

[illegible] periods in syphilis are described. This is confusing and [illegible] Syphilis exists and extends into the tissues as soon as the spirochaete [illegible] adenitis has been observed before the advent of the [illegible] The [illegible] stages. In our review of the second edition we drew [illegible] to Mr. Bayly's criticisms of the Wassermann reaction. The Wassermann [illegible] is the most searching test in medicine, and none of the evidence here reproduced to prove that laboratory tests are inconsistent shakes our faith in the value of this test. We cannot agree that there is no relation between the

tendency [illegible] positive Wassermann [illegible] the number of cells in the cerebro-spinal fluid. As the number [illegible] spinal fluid increases, so do [illegible] When there are 200 lymphocytes per c.mm. a positive [illegible] usual finding, when there are 1,000 [illegible]

[illegible] the third edition [illegible] from its predecessor.

R. J. G. P.

Practical Methods [illegible] Diagnosis [illegible] Treatment of Venereal Diseases. By David Lees, D.S.O., M.A., M.B., F.R.C.S., Surgeon in Charge of Venereal Diseases, the Royal Infirmary, Edinburgh; Surgeon in Charge of Venereal Diseases [illegible] Hospital, Edinburgh; Lecturer and Examiner in Venereal Diseases, the University of Edinburgh and the Royal College of Surgeons, Edinburgh; Clinical Medical Officer, Edinburgh Corporation Venereal Diseases Scheme, &c. With introduction by William Robertson, M.D., M.R.C.P., D.P.H., Medical Officer of Health, Edinburgh. [illegible] Pp. 60? + [illegible] 87 illustrations. Price [illegible]

The book is divided into two parts: Part I deals with Syphilis and Chancroid, Part II with Gonorrhoea. From the author's preface it may be assumed that the contents of the book [illegible] the present day teaching of the Edinburgh School, a teaching which [illegible] be said to be scientific, comprehensive and sound. In a book of this size it is not possible to set forth at length the intricate details of every phase of [illegible] affection, but the author has accomplished a difficult task in that he has [illegible] concise language the essential facts which every student and practitioner should have in his possession. A student with a thorough grounding in the contents of this book is well armed [illegible]

Despite the general high standard of teaching there are certain parts of the book which do not conform with modern ideas. There are few workers who will agree with Mr Lees that the demonstration of *Sp. pallidum* in a [illegible] lesion [illegible] importance to clinical [illegible] and that a negative Wassermann test means exactly nothing. The author does not make it sufficiently clear that there is no primary stage in syphilis and that the infection may be generalised before the appearance of adenitis. It is a pity that he follows the [illegible] teaching of the existence of stages in syphilis—a fallacy long since exploded by modern workers. Very rightly he emphasises the fact that the disappearance of lesions does not mean that cure of gonorrhoea or syphilis may be presumed.

The chapters in Part I devoted to syphilis afford instructive reading, especially those which lay stress on the treatment of syphilis during pregnancy and of congenital syphilis. From the preface one is led to expect more than is contained in Chapter XVII (less than sixty lines), which has for its subject the standard of cure of syphilis. Expectations of relapse vary with different courses of treatment. Mr Lees prefers to be indefinite. Conclusions based upon a particular course of treatment cannot reasonably be advanced as final. The relative value of a particular form of treatment can only be judged by a comparison with the results of other workers, similar standards of cure being applied. Ultimate results of treatment are difficult to investigate in civil life, but it is to be hoped that in future years Mr Lees will publish detailed reports of those cases he has been able to follow up.

In reading Section II one looks in vain for some new treatment for gonorrhoea. This is not a reflection on the author—on the contrary, this part of the book is of a high standard of excellence. There are certain slight defects. The external meatus is stated to be the narrowest part of the urethra—it usually is, but it may not be. The use of mechanical dilators in the posterior urethra is

[illegible] Compa[illegible] [illegible]ingless and [illegible]

[illegible] will not help the [illegible] false [illegible] Guyon [illegible] is to be found [illegible]

[illegible] that the [illegible] the locus of [illegible]

[illegible] was noted in [illegible] case they are [illegible] to the use [illegible] syringe with [illegible] the technique of [illegible] illustration on p 151 is [illegible]

Th[illegible] consistent He splits an [illegible] p. 23 [illegible] as the syphilis But it is a good book a book [illegible] practitioner a book whose [illegible] should [illegible] student

R I G P

A MANUAL OF PROCTOLOGY [illegible] M.D. F.A.C.S. Instructor in Proctology [illegible] School of Medicine Surgeon to Rectal Department [illegible] President American Proctologic Society Second [illegible] and Febiger Philadelphia and New York 101 [illegible]

Proctology does not [illegible] the surgical literature of this [illegible] are familiar names The [illegible] known to English practitioners [illegible] reckoned as an accomplished [illegible] book is of absorbing interest [illegible] depicts with unusual clarity [illegible] of clinical [illegible] This [illegible] quality is outstanding The [illegible] Chapter I where a full [illegible] of investigation will be found Subsequent [illegible] of a high degree of excellence [illegible] account of fistula and its [illegible] prolapse [illegible] The author [illegible] chloride in the injection [illegible] technique [illegible] operation is clear [illegible] to the importance of selecting suitable cases for treatment by [illegible]

[illegible] are described (1) Whitehead's (2) the [illegible] with the patient in the right semi prone [illegible] of redundant anal integument it is recommended [illegible] operation in which these implements are used after [illegible] attachments The last two operations are [illegible] performed under local anaesthesia The after treatment of these [illegible] clear description

[illegible] three needle method" is advocated for removal of prolapsed [illegible] membrane The author describes his own ingenious operation [illegible] a combination of linear cauterization and mucocutaneous plastic [illegible] of the anal orifice For the treatment of rectal [illegible] of the external sphincter *After* muscle and skin [illegible] a deep tension suture passing widely through skin

[illegible] to pass the [illegible]

This [illegible] out. These pages are pack[illegible] to [illegible] is considered advisabl[illegible] operations are con[illegible] in two stages after a p[illegible] article (1921) is reproduce[illegible] the most important [illegible] are quoted [illegible] (a) devascul[illegible] associated tissues; (b) [illegible] which also [illegible] parts by a perineal [illegible] pleted in five minu[illegible] and completeness [illegible] The perineal [illegible] and with the [illegible] illust[illegible] can be followed [illegible] cases.

It seems a pity [illegible] helps to perpetuate the ubiquitous [illegible] opium [illegible] local [illegible] stories of opium have no topical [illegible] acts only [illegible] the central nervous system. Spinal [illegible] is not mentioned. The [illegible] contains no reference to congenital [illegible] affections [illegible] referred to occasionally throughout the [illegible] spelling is [illegible] On p. 10 there is a [illegible] illustrations [illegible] very good indeed. The book is [illegible] save the type [illegible] correcting has been done [illegible]

This work can be recomm[illegible] to our notice. Its perusal is [illegible] of surgical science.

[illegible]

The Heart and its Diseases. [illegible] By Charles W. C[illegible] M.D. [illegible] M.R.C.P. [illegible] Physician to the National Hospital for Diseases of the Heart [illegible] First Edition. Edinburgh: E. and S. Livingstone. [illegible] Illustrations. Price 8s. 6d. net.

This small volume sets out to [illegible] well established facts and theories in connection with diseases of the heart. [illegible] have made himself [illegible] as a speedy manual of reference [illegible] and illustration characterize [illegible] conveniently [illegible] volume. The anatomy of the heart and its [illegible] within brief limits. The author [illegible] disease. "The consequences of [illegible] other [illegible] to the endocardium and it is impossible to [illegible] observation." Dyspnoea and its causes [illegible] cardiac pain are neatly but clearly [illegible] with rheumatism and diphtheria [illegible] heart disease and due importance is attached to focal sepsis [illegible] affections.

Perhaps the most striking chapter in the book [illegible] deals with heart disease in children, but the section on cardiac [illegible] adolescents is scarcely exhaustive enough. The failure of the vegetative system to adapt itself speedily

[illegible] position and [illegible] albuminuria are [illegible] mentioned [illegible] [illegible] and there is a very welcome chapter [illegible] the stress on the [illegible] the vascular syphilis. The author [illegible] the [illegible] of the [illegible] giving good pathological illustrations [illegible] mentioning [illegible] such as Aschoff's nodules and [illegible] and pseudo angina are nicely contrasted [illegible] is [illegible] proper place in the scheme of things and the [illegible] in relation to the results of modern graphic [illegible] is contributed by Strickland Goodall [illegible] and there are two useful chapters at [illegible] marriage and pregnancy in cardiac patients [illegible] in this connection. The new adrenal technique [illegible] in detail. The chapter on treatment might [illegible] even in a volume which claims to be [illegible]. The [illegible] handy one and its meaning is never in doubt [illegible] the purpose of a book of reference. J. G. D.

[illegible] By A. Vavasour Elder, D.S.C., M.R.C.S., L.R.C.P., [illegible] Commander R.N.V.R. London: Baillière, Tindall and Cox [illegible]. Pp. xiv + 523. Price 10s. 6d. net.

This book, [illegible] surgeon of over twenty years service, gives valuable information [illegible] all those in medical charge of merchant ships [illegible] be described [illegible] treatise on the subject yet published. It may roughly be divided into [illegible] parts. (1) The first seven chapters which are of special interest to all [illegible] adopting the life of a ship's doctor. (2) The [illegible] chapter [illegible] institutions and can be strongly recommended for the [illegible] practitioners before advising patients a voyage for [illegible] of their health. [illegible] The remainder of the book deals with ailments which are likely to [illegible] man at sea.

The author deals with [illegible] in a very clear and unbiased manner. Naval medical officers will [illegible] interest; they will see how widely [illegible] the two services. To mention one point, the naval recruit passes a strict medical [illegible] and is engaged for a certain number of years. The merchant seaman [illegible] for the voyage only and what happens to him between engagements or after his discharge from hospital is unknown. As the author states there [illegible] men signed on for each voyage and it is therefore impossible to compare the statistics of the two Services.

At the end of the book will be found a number of useful appendices and a good index. P. T. A.

The Post Graduate Medical Journal. The Official Organ of the Fellowship of Medicine. London: John Bale, Sons and Danielsson, Ltd., 83 Titchfield Street, W.1. Pp. [illegible] + 16. Published monthly. Price 6d. Annual Subscription [illegible] post free.

The Fellowship of Medicine has its offices in the building of the Royal Society of Medicine, London. This Journal is the official organ of that body. It publishes details of post graduate teaching not only in this country but elsewhere. Selections of the lectures which are delivered at the instance of the Fellowship of Medicine are also published. These are supplemented by specially contributed articles by suitable clinical descriptions and similar material. Full programmes of post graduate lectures, intensive courses at general hospitals and courses in special subjects are also included. It might be well to mention that this Journal is not only a means of publishing programmes—this is only a small part of its contents—but lectures and articles also which are essentially practical and designed to assist the medical man who wishes to keep acquainted with recent advances in

[illegible] ... the author's final [illegible] ... who are [illegible] to the practical [illegible] problems [illegible].

H. B. H.

[illegible] Normal and Abnormal Structures of the Body. [illegible] M.B., [illegible] F.R.C.S. Edin., D.P.H. [illegible] Hon. Consultant [illegible] Surgeon (in charge), Surgical Army Department, Royal Infirmary, [illegible] Royal College of Surgeons, Edinburgh; and [illegible] F.R.C.S. Edin., F.R.S.E., Assistant [illegible] Surgeon, [illegible] Edinburgh; Examiner, Royal College of Surgeons, [illegible] revised and enlarged. Edinburgh: E. and S. Livingstone. [illegible] 1937. Pp. 256, with 118 radiograms and 25 diagrams. Price [illegible].

This volume supplies a [illegible] needed want to the medical profession. [illegible] nothing is more difficult than to have to interpret a radiogram without a comparison, and here the authors have certainly [illegible] in the end.

The atlas consists of six parts, with an appendix and index. The first [illegible] a comprehensive series of sixty radiograms which deal with the normal [illegible] and epiphyses. In the shoulder alone six skiagrams are given stating the [illegible] *fons et origo*—[illegible] all essential [illegible]. Injuries and diseases of the limbs are demonstrated [illegible].

A great deal of interest [illegible] in the section on the head and neck [illegible] which the morbid conditions of the teeth are depicted [illegible] changes and [illegible]. The abdomen and thorax leave nothing to be desired. [illegible] clearly dealt with, the radiograms being explanatory [illegible]. The gall bladder after injection with tetraiodophenolphthalein [illegible] neither has the demonstration of [illegible] been [illegible]. The [illegible] consists of 256 pages of clear type which is easily read. The explanatory [illegible] are concise and clear; the skiagrams are excellently reproduced. [illegible] has been dealt with in detail and nothing has been omitted. [illegible] in this work which commends itself is that the authors have [illegible] the arrows demonstrating the chief features in each radiogram. The [illegible] are to be congratulated on producing such a valuable Atlas of Radiology, which ought to be included in the library of all those engaged in the practice of [illegible] surgical and dental professions.

T. W. M.

A Handbook of Diseases of the Stomach. By Stanley Wyard, M.D., [illegible] M.R.C.P., Physician to the Bolingbroke Hospital and the Victoria Hospital for Children; Assistant Physician to the Cancer Hospital. London: Humphrey Milford, Oxford University Press. 19[illegible]. Pp. [illegible]. With 32 illustrations. Price 15s. net.

This volume has been written [illegible] value to the general practitioner in his treatment of indigestion. [illegible] has been laid on the rôle of radiography [illegible] in the diagnosis of gastric disease, and attention directed to the various conditions in which these methods may be usefully employed. In dealing with the clinical examination of the patient the modern tendency to the separation of medicine into various watertight compartments is considered especially deplorable in relation to gastric disease. Symptoms referable to the stomach accompany a very wide range of pathological conditions, and it is obvious that a systematic examination of the whole body must be made.

The excellent descriptions of the techniques employed for examination of the gastric contents, gastric lavage and duodenal intubation call for special notice.

[illegible]

Certain the [illegible] in Chapter V [illegible] is noted that the use of bismuth [illegible] is deprecated. It is admitted that this drug [illegible] pending further and rational treatment, [illegible] be used. As regards the use of alkalis the author agrees [illegible] and may properly be used for relief of symptoms, but [illegible] effect is entirely temporary and they have no curative properties [illegible] carbonate and magnesium oxide are given first place. The [illegible] gastric ulcer and carcinoma of the stomach [illegible] contains much useful information. The [illegible] of peptic [illegible] is dealt with in Chapter VII, and in view of the differences of opinion [illegible] this point the author [illegible]. He holds the view that gastric ulcer is not a [illegible] cause of cancer, but [illegible] and that probably about 5 per cent of gastric ulcers originate in [illegible].

[illegible] book will [illegible] the purpose for which it has been [illegible] highly recommended to the attention of naval medical officers. [illegible] X-ray illustrations [illegible] particularly good.

R. W. G. S.

[illegible] By [illegible] Fletcher, M.B., M.R.C.S. London: [illegible] Ltd. Third edition. Price [illegible] net.

[illegible] for revision by those who have an [illegible] subject. This treatise is too advanced for [illegible] but would be essentially useful [illegible] as a means for refreshing their memories from [illegible] book for examination purposes.

M. C. C.

[illegible] Heart: Their Diagnosis, Prognosis and Treatment by [illegible] By [illegible] M.D., F.R.S.Edin., Physician to the National Hospital for Diseases of the Heart, Consulting Physician to [illegible] Hospital [illegible]; formerly Physician and Honorary [illegible] Mount Vernon Hospital for Consumption and Diseases of the [illegible] Medical Graduates College [illegible] Medicine at the University of St. Andrews. [illegible] Oxford University Press. 1927. Pp. xvi + [illegible]. Second Edition. Price 25s. net.

[illegible] this book, which was published eight years ago, achieved [illegible] reputation. We welcome the appearance of the second edition, [illegible] thoroughly revised and brought up to date. This book is intended [illegible] the subject [illegible] from the point of view of [illegible]. All the important advances in cardiology within recent years [illegible] the main object in view being to present in as concise [illegible] which will be of service in the diagnosis, prognosis and [illegible] of the heart by modern methods. Much new matter [illegible] quinidine therapy, bundle branch [illegible] auricular fibrillation and of auricular flutter, auricular [illegible] flutter) occurring in thyrotoxic conditions, syphilitic [illegible] and the pericardium, anaesthesia in relation to [illegible] examination in diseases of the heart and thoracic aorta. [illegible] the author [illegible] that a routine examination [illegible] most important adjunct, and sometimes is essential [illegible] diseases of the heart and thoracic aorta. He observes that the [illegible] of the heart and great vessels has not yet received the attention [illegible]

Chapters XII–XVIII [illegible] good, and contr[illegible] polygraphic tracings [illegible] clinical electrocardiography [illegible] careful study. As the [illegible] means at our disposal [illegible] the state of the [illegible] regarded as an instrument [illegible] available to the general practitioner [illegible] printed, and we can thoroughly recommend it as one of the [illegible] on the subject.

C. W. [illegible] S.

News of the Service

OBITUARY

We regret to report the death of Fleet Surgeon Samuel [illegible] place on November [illegible] 192[illegible]. Born on January 6, 1853, [illegible] degrees of L.R.C.S.I. and M.R.[illegible] entering the Royal Navy [illegible] the rank of Staff Surgeon on March 10, 18[illegible] Fleet Surgeon [illegible] June 3, 1895. He was placed on the retired list [illegible] 1901.

PROMOTIONS

Surgeon Lieutenant-Commander F. C. [illegible] specially promoted [illegible] dated February [illegible] 1927, having obtained [illegible] per cent. [illegible] promotion examination held in July, 1927, thus qualifying [illegible]

Surgeon Lieutenant-Commander A. W. G. [illegible] M.B., to be Surgeon Commander, [illegible] 28, 1927.

Surgeon Lieutenant-Commander A. C. A[illegible] M.B., to be Surgeon Commander, September [illegible], 1927.

Surgeon Lieutenant-Commander A. [illegible] M[illegible] to be Surgeon Commander, November [illegible] 1927.

Surgeon Lieutenant-Commander A. [illegible] M.B., to be Surgeon Commander, November [illegible] 1927.

Surgeon Lieutenant-Commander [illegible] S[illegible] D.[illegible] to be Surgeon Commander, November [illegible] 1927.

Surgeon Lieutenant-Commander [illegible] W. [illegible] M.B., to be Surgeon Commander, November 2[illegible], 1927.

Surgeon Lieutenant-Commander R. [illegible] N[illegible] M.B., to be Surgeon Commander, December [illegible] 1927.

Surgeon Lieutenant-Commander J. D. Murphy, M.B., to be Surgeon Commander, [illegible] 1927.

Surgeon Lieutenant (D) F. R. P. Wi[illegible] to be Surgeon Lieutenant-Commander (D), November 21, 1927.

Surgeon Lieutenant (D) T. E. Brew[illegible] to be Surgeon Lieutenant-Commander (D), [illegible]ber 29, 1927.

Surgeon Lieutenant (D) H. J. [illegible] to be Surgeon Lieutenant-Commander (D), [illegible] 1927.

APPOINTMENTS

SEPTEMBER.

Surgeon Lieutenant-Commander (D) A. Macpherson to R.N. Barracks, [illegible]

Surgeon Lieutenant [illegible] W. [illegible] to *[illegible]*. Surgeon Lieutenant [illegible] Surgeon Lieutenant H. J. Scott, M.B., to *[illegible]*. Surgeon Lieutenant [illegible] M.B., to *[illegible]*. Surgeon Lieutenant T. [illegible] Barlow to *[illegible]*. Surgeon Lieutenant (D) [illegible] W. Wall to R.M. Infirmary, Portsmouth. Surgeon Lieutenant (D) T. Hunt to *[illegible]*.

RETIREMENTS

[illegible] A. F. Hawkins placed on retired [illegible] September 20, 1927. [illegible] M. W. Heydon placed on retired [illegible] October 5, 1927. [illegible] H. M. Dickinson, M.B., placed [illegible] September 5 [illegible] Fawley, M.B., placed on retired [illegible] placed on [illegible] November 23, 1927.

QUEEN ALEXANDRA'S ROYAL NAVAL NURSING SERVICE

New Entries

Miss O. H. Franklin, M.B.E., entered as Nursing Sister, November 1, 1927.
Miss E. B. [illegible] entered as Nursing Sister, November 28, 1927.
Miss I. M. Blackford entered as Nursing Sister, December 1, 1927.

Appointments

Nursing Sister Miss S. M. Crawford to R.N. Sick Quarters, [illegible] November 1 [illegible] Nursing Sister Miss O. H. [illegible] to Chatham Hospital, November 1, 1927. Nursing Sister Miss G. B. [illegible] to Plymouth Hospital, November 1, 1927. Nursing Sister Miss I. M. Blackford to Plymouth Hospital, December [illegible].

The attention of all naval medical officers is called to the forthcoming publication [illegible] *International [illegible]*, particulars of which are given below.

INTERNATIONAL BULLETIN

[illegible] Congress of Military Medicine [illegible]

Permanent Committee

Honorary Presidents.—[illegible] Médecin [illegible] (Belgium), Lieutenant-General [illegible] Della Valle (Italy), Médecin Inspecteur Général Vincent (France), [illegible] de Belgrade [illegible] (Poland).
President.—[illegible] General Sir Matthew Fell (England).
Members.—[illegible] (Brazil), [illegible] Hennsberg [illegible] (Spain), [illegible] (United States of America), Levy (France), [illegible] (Great Britain), [illegible] (Holland), [illegible] (Switzerland).
Secretary.—Major [illegible] Military Hospital, Liège).

National Delegate Members

Argentine [illegible] (Buenos Aires), Austria, Belgium [illegible] (Brussels), Brazil, Bulgaria, Canada, Chile, China, Colombia, Cuba [illegible] (Prague), Denmark, *Dr.* [illegible] (Copenhagen), Ecuador, Egypt, Esthonia, Finland, France, *[illegible]* (Paris), Germany, Great Britain, Greece, [illegible] Holland [illegible] (Utrecht), Hungary, India [illegible] Ireland [illegible] Italy [illegible] Japan, Jugoslavia [illegible] Latvia, Lithuania, Norway, Mexico [illegible] Persia [illegible] Poland [illegible] Roumania [illegible] Salvador, Siam, Spain, Sweden, Switzerland [illegible] (Berne), Turkey, United States of America [illegible] (Washington), Uruguay, Venezuela.

Thirty-six delegates [illegible] countries and more than 1,000 [illegible] attended the Fourth International Congress of Military Medicine [illegible] Warsaw. At the general assembly on June 4 [illegible] important decision was [illegible] which should have a most beneficial influence upon the [illegible] of medical [illegible] the [illegible] ideal [illegible] by the Military Medical Forces of all [illegible]. It was definitely decided to establish on a permanent basis [illegible] military medical

organ at [illegible] has [illegible]
Congress [illegible]

[illegible]

The World [illegible]

[illegible] France [illegible] United St[illegible]

[illegible]

[illegible] Roumania [illegible] United St[illegible]

NAVAL MEDICAL COMPASSIONATE FUND

[illegible] Meeting of the Directors of the Fund held on October [illegible] voted to the applicants. The following is a summary of the cases [illegible] of a Fleet Surgeon who died in 1896. Has been totally blind for [illegible] bedridden. Has no income apart from Widow's Pension. Voted £25. [illegible] awards £160.

[illegible] of a Surgeon who died in 1862. Is in receipt of an Old Age Pension [illegible] Voted £15. Total amount granted at different awards £[illegible] of a Surgeon Lieutenant Commander who died in 1924. Was left [illegible] and her income is insufficient for this [illegible] amount granted at different awards £110.

[illegible] Deputy Inspector General who died in 1898. Was caring for [illegible] for a special disease for which she is at present undergoing [illegible] Has no private means. Voted £50. First application for assistance.

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Journal
of the
Royal Naval Medical Service.

Original Articles.

THE KATA THERMOMETER AT SEA IN THE TROPICS.

By Surgeon Commander S. F. Dudley, O.B.E., M.D., M.R.C.P., D.P.H., D.T.M.&H., R.N.

The observations on which this paper is based were made during the first quarter of 1921 in H.M.S. *Dunedin* during the passage home from Auckland, New Zealand, to Sheerness, England, via the Panama Canal. The instruments used were the sling psychrometer and kata thermometer as supplied for service afloat.

(1) Introduction.

[These introductory remarks are only written for the benefit of those who have forgotten most of their physics. I have purposely left out all consideration of conduction and radiation of heat and of barometric pressure which would only complicate unnecessarily a simple explanation which is introduced merely for the purpose of understanding this paper.]

The sling psychrometer is a wet and dry thermometer. The dry bulb gives the actual temperature of the air, and from the difference between this temperature and that registered by the wet bulb thermometer, which shows the amount of depression of the temperature caused by evaporation of water from the surface of the wet bulb, the weight of water vapour in a unit volume of space can be found by the use of tables. This figure is usually given in grains of water per cubic foot and is the *absolute humidity*. The ratio of the absolute humidity to the greatest weight of water vapour that could occupy the same space at the same dry bulb temperature (and barometric pressure) is called the *relative humidity*.

Relative humidity is usually expressed as a percentage, and is readily obtained from the sling psychrometer readings and the book of tables supplied with the instrument. The lower the reading of the wet bulb

[illegible] temperature [illegible] the atmosphere [illegible] As the [illegible] content [illegible] and [illegible] temperature diminishes the amount of [illegible] which can evaporate [illegible] less and less until both thermometers [illegible] ical readings The [illegible] is then saturated and if there is any fall [illegible] rature it must be [illegible] panied by precipitation of water as dew [illegible]

In hot environments when there is little difference between the two [illegible] meter readings the relative humidity is high and cooling the human body becomes difficult [illegible] sweat cannot readily evaporate The [illegible] humidity is a convenient index of the "wetness" or "dryness" of the atmosphere at the same dry bulb temperature of different places However it must be clearly understood that should two places both have a relative humidity of say, 80 it does not mean that there is the same mass of water vapour per cubic foot in each place unless the dry bulb temperatures are also identical For example if the temperature was 50° F and the relative humidity was 80 per cent, there would be about 3 3 gr of water in each cubic foot of space If the temperature was 100° F and the relative humidity still remained 80 the amount of water would increase to about 15 8 gr Therefore though the relative humidity remained unchanged the absolute humidity would be nearly five times as great at the higher air temperature

When a body at a certain temperature is exposed to air at a different temperature it will take up or give out heat The rate at which heat is exchanged is more rapid the greater the difference of temperature between the body and the air It is easy to see if the air in immediate contact with the body remained unchanged it would quickly acquire the same temperature as that of the body and no further loss or gain of heat could take place (except by conduction or radiation) Therefore in cooling (or heating) a body with air besides difference in temperature, the rate at which the air surrounding a body is changed becomes a factor of supreme importance If the surface of the body is dry these two factors, difference of temperature and rate of air movement (*i e*, wind) suffice for practical purposes, in considering the cooling properties of the atmosphere But when the surface is wet another factor has to be considered, which is the loss of heat due to evaporation of water

In the tropics outside the question of an adequate supply of air for respiratory purposes, the problem of ventilation becomes chiefly one of cooling the human body In hot environments the difference between the temperature of the human body and the air surrounding it is very small and therefore the cooling power due to this factor is also very small, and when the temperature of the air is above normal body temperature the difference of temperature becomes a heating instead of a cooling effect Hence in the tropics the cooling of the human body depends almost entirely on the evaporation of sweat The great efficiency of evaporation in abstracting heat from the body is realized when it is remembered that in

order to change one grain of water as liquid into one grain of water as vapour at about body temperature and ordinary atmospheric pressure requires the same amount of heat as is necessary to raise about 580 grm of water 1° C. (latent heat of water vapour at 40° C. = 579 grm calories). It is entirely due to the large amount of heat absorbed from the skin by the evaporation of sweat that a human being is able to maintain his temperature below 99° F. when the surrounding air may be over 120° F. Therefore in considering the cooling effect of the air on a wet body, such as a sweating stoker, the amount of heat absorbed by evaporation of water from the surface must be added to the amount of heat lost by difference in temperature. Loss of heat by evaporation may more than neutralize the heat gained from the surrounding air even when the latter is many degrees above normal body temperature. The amount of water that can evaporate depends on the temperature of the air, the same space being capable of taking up more water as vapour at high than at low temperatures and the amount of water that is already in the air, i.e., the relative humidity. However, should the air surrounding a wet man be motionless, the air in immediate contact with the skin will soon become saturated and no further evaporation can take place: therefore the amount of air motion again becomes of paramount importance. The wet and dry bulb temperatures only tell us the condition of the air and its potential capacity for cooling the human body by difference of temperature and evaporation of water. The psychrometer, therefore, gives no information as to the rate a body will cool in any atmosphere unless the average velocity of the air currents is also known. What is required for practical purposes in the tropics and hot places is a single instrument that will measure the cooling power of air on a wet surface about the same temperature as that of the human body. Namely, an apparatus that will give a good indication of the cooling effect of warm moving air on the sweat-covered skin. If the air is cool and the the skin therefore dry the instrument of choice would be one that measured the cooling effect due to difference of temperature and rate of air movement only—the effect of evaporation being omitted. Leonard Hill has devised an instrument to fulfil these requirements which he has called the Kata-thermometer. This is merely an alcohol thermometer which can be used with the bulb, wet or dry. To measure the cooling effect of the air the kata-thermometer is heated to 100° F. and the time its temperature takes to drop from 100° F. to 95° F. is recorded. This time gives the cooling rate of the instrument at approximately average human body temperature.

In order to obtain comparative results and a figure that means something each kata-thermometer is calibrated and given a 'factor.' This factor is a number (marked on each individual instrument) of such magnitude that the quotient of the time taken to drop from 100° F. to 95° F. into the factor will be the same for all kata-thermometers under the same conditions of temperature and air movement. The figure thus

obtained will be the number of millicalories of heat lost per second per square centimetre of bulb surface of the kata thermometer (A millicalory is one-thousandth of a gram calory which is the amount of heat required to raise 1 grm of water 1° C) For example the instrument I was using was marked 468 Suppose when taking an observation that the top of the alcohol took 117 seconds to drop from the upper (100° F) to the lower (95° F) index marks then the kata reading would be 468 — 117 = 4 millicalories lost per sq cm per second The dry kata thermometer is a single instrument that sums the effect of the temperature of the air and the velocity of its motion in cooling an instrument whose temperature is about that of the human body It is the instrument to use in those environments where the skin remains dry The wet kata thermometer adds on the effect of evaporation to temperature difference and wind It is therefore, the instrument of choice for use in the tropics and those environments in which the human subject perspires and is lightly clothed As is shown later the wet kata thermometer may actually show a powerful cooling effect at the same time as the dry instrument shows a heating effect This is because the heat lost by evaporation may be considerably greater than heat gained from air which is above the temperature of the human body For practical purposes the wet kata thermometer figure other things being equal varies as the wet bulb thermometer temperature regardless of the dry bulb temperature For this reason in the tropics when a kata-thermometer is not available the wet bulb thermometer is a much better guide for estimating the suitability of the atmosphere for human habitation than the ordinary dry bulb thermometer the readings of which are always most deceptive as indices of comfort

I will not waste time in describing the technique of using the sling psychrometer and kata thermometer as full instructions always accompany the instruments I would only like to warn any who may be using these instruments for the first time that when the psychrometer is used in different places at short intervals time must be allowed to get a reliable reading and the swinging must be repeated until two or three consecutive readings give identical results Also the knack must be cultivated of reading the wet bulb instrument quickly and keeping one's hot hands away from the thermometer bulbs

(2) Observations in an Officer's Cabin

Between February 27 and March 24 the ship passed through the Panama Canal, touched at Trinidad and then proceeded to Sheerness During this period a daily record was kept of the psychrometer and kata thermometer readings in the medical officer's cabin The observations were made at 8 a m under as far as possible the same conditions as regards air movement The air supply and electric fan were shut off and the cabin door and scuttle closed just before the instruments were used These conditions were the nearest approach to still air that was practicable but

slight air currents were created by the movement of the ship and the percolation of air through the louvres on the cabin door Such imperceptible air currents help to account for the fact that the kata figures were not always identical for the same wet and dry bulb temperatures

To avoid confusion, before proceeding farther, I wish to explain that when I refer to "fan" or "electric fan" in this paper I mean an unenclosed portable "table fan" used to stir up air in distinction to the closed fixed fans in the ventilating trunks which were responsible for the forced "air supply" of the ships the power driving these unseen fans was of course also electric

These daily records were always taken with the kata hung from a fixed hook in the deck above with the bulb of the instrument 5 ft above the deck below Fig 1 is a chart which shows these daily records Though of course it is fully realized an "index of comfort" of atmospheric conditions must vary considerably as regards the type of employment, clothing relative humidity and degree of acclimatization of the individual, yet Leonard Hill's conventional standards of 6 for dry and 18 for wet kata are a good working average for England Therefore for the sake of comparison in fig 1 the scale of the wet kata-thermometer figures is reduced to a third of that for the dry figures so that at the conventional standard of comfort in this country both readings occupy the same level on the chart During the first fortnight of the period fig 1 covers, the ship was travelling roughly due east along the same parallel of latitude (about 10° N) in the tropics and the curves of all four thermometers remain fairly parallel to each other The dry kata was between 2 and 3, and the wet between 7 and 8 In the still air of the cabin the conditions were stuffy and uncomfortable even for sedentary work After leaving Trinidad the ship began to work north from 11th to 51st parallel of latitude The cooling power of the air got greater as is indicated by the temperature curves dropping and kata curves rising in fig 1 In the "still" cabin air the dry kata figure passed the "index of comfort" on March 18 but the wet kata remained below 18 until March 24, on which day H M S *Dunedin* arrived in Sheerness The ship's company, who less than a fortnight previously had been perspiring in Trinidad found Sheerness very damp, cold and miserable

Fig 1 shows how as the difference between body temperature and air temperature increased, the dry kata-thermometer curve, which in the tropics was just below the wet curve, crossed it and became steeper than the wet kata curve This illustrates the point that in cool climates the difference between the temperature of the air and that of the skin is relatively the more important factor in cooling the human body whereas in the tropics evaporation is the chief factor in heat loss Let alone the fact that in the tropics a wet kata thermometer more closely represents a sweating man, the recording of dry kata readings is a tedious proceeding, when the temperature is over 80° F For example a dry kata figure of 2 takes more than four minutes to obtain whereas under similar conditions

a minute to a minute and a half is all the time required to take a reading with the wet kata-thermometer

Table I summarizes some figures designed to show the effect of the air supply and an electric table fan on the cooling power of the cabin atmosphere The kata thermometer was hung in the same place as previously described The air entered the cabin through a three-inch pipe almost in a direct line with the kata-thermometer but seven feet away and a foot above it The fan which was always fixed in the same position for these series of experiments was six feet away from the kata thermometer bulb but set so as not to blow directly at it The fan's axis was at an angle of about 45° with a line joining the centre of the fan to the bulb of the kata thermometer On examining Table I it is at once evident that the cooling power of the air is increased when the air supply is turned on but not to a very great extent The cabin fan by itself, with the air supply off, had a much greater cooling effect than the air supply If the figures in Table I are averaged it is found that turning on the air supply increased the cooling power by about 20 per cent while the fan caused a 50 per cent improvement The increase in heat loss caused by the fan and air supply together was roughly the sum of the above percentages (i.e., 70 per cent) In Table I, when both the fan and ventilation were off the kata-thermometer readings varied inversely with the temperature readings. But when the fan and air supply was on, several discrepancies in this respect can be picked out For example in still air in the D series of readings the wet bulb temperature was 80° F and the wet kata figure 5·8 in the C series the figure was 6·9 and as would be expected the wet bulb thermometer was 2° lower However when the fan and air supply was turned on the cooling effect rose to 11·7 in the D series as against 10·2 millicalories per square centimetre per second in the C series, in spite of the fact that the wet bulb was cooler when the smaller kata cooling figure was obtained The anomaly is not due to an error in observation, but is simply explained by the fact that the amount of electric current to both the fan and ventilation motors varied considerably from time to time At the time the D series was made more electric current was available to be transformed into air currents which in turn were able to absorb more heat from the kata-thermometer so that in spite of the fact that the wet bulb temperature was higher in the D than in the C series of readings, the cooling effect of the greater air movement more than compensated for the lower temperature

The observations in Table I series A, were made in Suva in the Fiji Islands alongside a wharf on a hot airless evening In the medical officer's cabin, with everything shut down the air felt oppressive and suffocating and the skin perspired freely even at rest When an old type small cabin fan was switched on the cabin became quite bearable and I was able to write and read for three hours clothed in a vest and duck trousers without sweating perceptibly, although the air supply was shut

off [illegible] wet kata thermometer [illegible] If series A [illegible] with B in Table I, which is [illegible] not unpl[illegible] at the Port of Spain in Trinidad it will [illegible] that the dry [illegible] gave practically identical readings in both Suva and Port of Spain But in Trinidad the wet bulb temperature was 3 F lower than in Suva and the cooling effect of the air on the wet kata thermometer was correspondingly greater These experiments are a good example of how in the tropics wet temperature instruments give readings which are much more consistent with human feelings of comfort than dry instruments The whole of Table I demonstrates well how movement of the air irrespective of the amount supplied is the important factor in cooling the human body

TABLE I — OBSERVATIONS IN OFFICER'S CABIN

showing improvement of cooling power effected by small cabin electric fan and to a less extent by current created by fresh air supply pipe

Series	Date and Place and Series	Dry bulb temperature	Wet bulb temperature	Dry kata	Wet kata	Cabin fan	Air supply	Remarks
		deg	deg					
A	Suva Fiji	87	82	1 7	5 2	Off	Off	Relative humidity 81
	31 1 27	87	82	2 1	6 2	Off	On	Hot damp and no
	6 30 p m	87	82	3 1	9 3	On	Off	wind Very oppres
		87	82	3 3	9 9	On	On	sive
B	Port of Spain Trinidad	87	79	1 5	6 8	Off	Off	Relative humidity 70
	8 4 27	87	79	2 2	7 0	Off	On	Hot but fairly fresh
	6 p m	87	79	2 8	9 8	On	Off	breeze
		87	79	3 2	11 1	On	On	
C	At Sea	85	78	2 0	6 8	Off	Off	Relative humidity 73
	Lat 9 N Long 86 W	85	78	2 5	7 8	Off	On	Fine calm day and
	1 3 27	85	78	2 8	9 4	On	Off	oppressive
	6 p m	85	78	3 1	10 2	On	On	
D	At Sea	81	80		5 9	Off	Off	Relative humidity 84
	Lat 5 S Long 176° W	84	80		7 8	Off	On	Heavy gale rolling
	31 1 27	84	80		11 7	On	On	over 20°
	10 a m							
F	English Channel	69	56	6 4	15 6	Off	On	Cool fresh breeze Hu
	21 3 27	69	56	9 8	22 3	On	On	midity 58
	10 a m							

The following experiment shows the direct effect of a small cabin fan on the kata thermometer when the scuttle door and air supply inlet of the cabin were shut The dry bulb thermometer stood at 85 F the wet at 79 F The bulb of the kata thermometer was placed in the axis of the fan at different distances from its centre with the following results

		2	11

Table III

Part of ship	Dry bulb temperature	Wet bulb temperature	Relative humidity	Weight of water vapour	Dry kata	Wet kata	
	deg.	deg.	%.				
Sick Bay	86	82	84	11 2	3 8	7 8	10 a m January 31 1927 Gale battened down Lat 5° S Long 175 W
[illegible] Mess	87	83	84	11 4		8 4	
Seamen's Mess	87	81	84	11 4		7 4	
Marines Mess	86	84	85	11 0		6 2	
Stokers Mess	87	83	84	11 4		6 2	
Deck in shelter	85	80	80	10 2		15 6	
Deck exposed	84	78	76	9 4	18 7	32 4	
Boys Mess	84	78	76	9 1		10 4	11 30 a m March 5 Strong wind scuttles closed hatches open Lat 11° N Long 76° W
Seamen's Mess	83	79	76	9 2		9 1	
Marines Mess	84	79	80	9 9		10 9	
Stokers Mess	83	78	80	9 6		10 7	
Wardroom under open skylight, Fan off	85	78	80	9 6		8 4	
Wardroom under open skylight, Fan on	85	78	80	9 6		13 1	
Corner of Ward room, Fan off	83	78	80	9 6		8 1	
Corner of Ward room, Fan on	83	78	80	9 6		10 4	
S M O's Cabin	83	76	80	9 6		8 5	
Upper Deck	82	76	76	9 1		[illegible]	
Boys Mess	82	76	76	8 8		11 4	March 6 1927 6 a m before hands turned out Rough rainy night forced all hands to sleep below Scuttles all closed Lat 12 N Long 70° E At sea
Seamen's Mess	82	76	76	8 8		11 4	
Marines Mess	82	76	80	9 3		9 6	
Stokers Mess	81	77	76	8 8		10 8	
C P O's Mess	86	80	70	9 7		9 8	
E R A's Mess	90	81	71	10 5		10 0	
Canteen Flat	92	83	68	10 7		7 4	
Seamen's Bathroom	86	81	74	10 4		7 5	
S M O's Cabin	80	75	78	8 0		8 5	
Upper Deck	78	73	78	8 1		23 6	
Sick Bay	84	78	80	9 3	3 2	10 4	March 6 1927 11 a m Fine sunny day all scuttles open good breezes across mess decks
Boys Mess	82	77	80	9 3	4 0	12 0	
Seamen's Mess	82	77	80	9 5	3 0	10 9	
Marines Mess	82	77	80	9 8	3 7	12 0	
Stokers Mess	83	78	80	9 6	4 3	13 0	
C P O's Mess	86	80	77	10 1	2 2	12 4	
E R A's Mess	80	82	71	10 5	1 5	12 7	
Canteen Flat	95	84	68	10 8		7 3	
S M O's Cabin	82	76	80	9 3		8 5	
Upper Deck	81	76	79	8 9			
Boys Mess	53	53	85	4 3	7 8	20 4	Cold rainy day at Ishore March 21 1927
Stokers Mess	54	45	88	4 0	7 3	15 1	
Upper Deck	51	43	67	1 6			

TA[illegible] [illegible]

[illegible]	[illegible]	W[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	110	[illegible]	41	[illegible]	[illegible]	[illegible]
[illegible]	117	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible] passage	97	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible] station	35	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	38	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	09	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	08	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible] deck	88	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	85	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible] sheltered	84	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Qua[illegible] rooms	84	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

TA[illegible] V

Place	Dry bulb temperature	Wet bulb temperature	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible] No 3 [illegible]	110	88	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Manoeuvring platform [illegible] deck	[illegible]	82	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Manoeuvring platform under fan	92	82	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Between L pressure turbine and air pump	105	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Under main steam pipe	121	100	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Dynamo platform	107	[illegible]	[illegible]	[illegible]	[illegible]	6	[illegible]
Manoeuvring platform	100	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Boiler room floor plates	105	86	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Grating over No 1 boiler	130	[illegible]	41	[illegible]	[illegible]	[illegible]	[illegible]
Space between boilers	140	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Quarter deck in lee of gun	[illegible]	77	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Quarter deck exposed	81	77	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Cabin fan off ventilation [illegible]	82	78	84	[illegible]	[illegible]	[illegible]	[illegible]
Cabin fan on ventilation [illegible]	82	78	84	[illegible]	6	[illegible]	[illegible]

TABLE VI

Switchboard room March [illegible] air supply [illegible]

TEMPERATURE

Dry bulb 112 wet bulb 90 Relative humidity 42 [illegible] per [illegible]
Upper deck dry bulb 83 78 73 [illegible]
Centre of room 4 ft above deck fan on dry kata [illegible] wet kata [illegible]
[illegible] in front of fan on [illegible]
[illegible] off [illegible]
Intensely hot profuse perspiration clad in [illegible] and vest

On the upper deck, sheltered from the wind, the temperature was 84 F dry 78° wet and the kata figures were 4 7 dry, 1[illegible] wet This at first sight makes it appear possible by the aid of a small fan to make a cabin as comfortable as the upper deck in hot weather As a matter of fact, except in the stillest of days the upper deck will always feel more comfortable

than the best of cab[illegible] the wind [illegible] all directions and [illegible] to continually in strength causing a [illegible] which itself [illegible] a feeling of freshness. Th[illegible] given above were taken in the centre of the steady wind stream of a small fan, and at distances of less than a ft the air current will not spread enough to include the whole of a human body and will only play on one side of it. It is not satisfactory to cool your head in a mighty draught if your feet remain in stagnant air. Thus the open air (in the shade) is nearly always pleasanter than a cabin with even the best of fans. However a small fan in the cabin made it possible for me to work and sleep in comparative comfort in a space which otherwise would have been almost unbearable at some of the wet bulb temperatures experienced. The dry kata-thermometer figures depend only on the dry bulb thermometer temperature and the velocity of the air, hence if the former is known the latter can be calculated from the kata reading. In this way the dry kata-thermometer can be used to measure the velocities of air currents. From the tables supplied with the instrument the velocities given in Table II were obtained.

By using the dry kata thermometer as an anemometer the strength of two fans can be compared. If the temperature remains the same the kata figures themselves will give the relative efficiencies of two or more fans. For instance on a day when the temperature was 60° F the kata figure 3 ft in front of my cabin fan was 19.5, making the velocity of the air about six miles per hour. At the same temperature and distance from a better type of fan the kata figure was 24.6, corresponding to a breeze of about ten miles per hour. In a similar manner the air supply of cabins can be estimated. The air is admitted by 3 inch pipes. By holding the kata so that the bulb of the instrument is just within the mouth of the pipe and below its centre a reading is obtained which will give an approximate velocity of the air supply. For example. A certain officer complained he was not getting his fair share of air. In order to test his statement, dry kata-thermometer readings were taken in the mouths of the air inlets of his cabin and mine, the figures obtained were 16.0 and 11.1 respectively. The temperature was 83° F in both cabins.

According to these figures the velocity at which the air was entering the complainant's cabin was 22 miles per hour. It was entering my cabin at 18 miles an hour. So anyhow this officer was getting more air than the medical officer. This case illustrates so well a fundamental truth of such importance in any investigations and indeed life in general, that I think no apology is needed for a short digression on the subject. In the above instance the officer who thought his air supply was too small took me into his cabin and I put my hand in the incoming stream of air. I then did the same in my own cabin. I was quite convinced that the complaint was justified and certain that he was getting less air than I was, yet when an instrument of precision was substituted for the palm of the hand the

[illegible] the case The [illegible] than mine and so strong [illegible] are the [illegible] that I quite believed that the air current in my cabin [illegible] on my hand than it did in the other A more homely example of [illegible] tion must have been seen by every naval officer of any seniority who has been a wine caterer If a self opinionated but popular member of the mess declares "this wine is filth," three-quarters of the mess will agree and the wine is damned The wise wine caterer will say nothing but merely removes it for a few weeks, and then replaces it again without remark, with the almost invariable result that no one notices the reappearance and all again start drinking "the filth" with gusto The power of suggestion and unconscious bias is so little realized and works insidiously on the mind, that the importance of accurate instrumental measurements compared with the many unsubstantiated statements so often called "facts" in textbooks cannot be exaggerated Yet in spite of this being so obviously true, a pious opinion attached to a famous name especially if the name has a large handle will always carry more weight with the majority of the herd than the most carefully controlled experiments of an obscure investigator

When a ship's ventilation system is inspected an air trunk may be found with ten or more inlets of which one or two are functioning at the expense of the others By taking kata thermometer readings in exactly the same position with regard to each inlet the regulating shutters can be adjusted until any desired air distribution is obtained To use the kata-thermometer for such a purpose a kind of hand bracket can be made in which the instrument can be fixed, and which when held against the ventilation trunk will keep the kata-thermometer bulb exactly 1 ft away from the centre of the lower edge of the air inlet under examination

(3) Scuttles and Scoops

The circulation of tobacco smoke in my cabin showed that the scuttle often acted as an exhaust rather than as an inlet for air On a flat calm day the ship steaming fourteen knots, the dry bulb temperature 73° F wet 68° F, some observations were made with the kata thermometer to test the cooling effect of the air draughts through the scuttle in the medical officer's cabin The instrument was hung 4 ft inboard from the aftermost point of the scuttle rim With the air supply and electric fan shut off and the scuttle open the average of six readings of the wet kata thermometer was 13 8 (maximum 15 0 minimum 11 7), 6 dry kata readings averaged 5 5 (highest 7 2 lowest 5 0) Under otherwise similar conditions but with the scuttle shut three dry readings were almost identical and averaged 4 2 Three wet kata readings took thirty eight seconds each to obtain i e the cooling power was 12 3 millicalories lost per second per square cubic centimetre Therefore the open scuttle distinctly improved the cooling effect of the cabin's atmosphere

On another flat calm day temperature 81° dry [illegible] wet speed fourteen knots an attempt was made to see what was the effect of a wind scoop on the air currents through the scuttle With the kata thermometer hung in the same place as before and a wind scoop in position the average of seven wet kata figures was 11 1 Under the same conditions but with the wind scoop removed the average of seven readings was 12 0 With the scuttle closed the wet kata figure was 8 5 Hence in this isolated experiment the wind scoop made no significant difference one way or the other to the cooling power of the air current through a scuttle I regret I did not go further into the question of scoops and scuttles before the ship [illegible]ed at Chatham Scuttles act as exhausts or supplies continuously, or alternately according to their position in the ship, direction of the wind and speed of the vessel Whether the air goes in or out will of course, equally affect the kata thermometer figures The irregular variable, and gusty character of scuttle draughts causes skin stimuli of different intensities which perhaps account for the preference nearly everybody has for natural [illegible] over pickled air

The scuttles in the fore part of the ship were more efficacious sources of air supply than those further aft On the mess decks which are situated in the bows of the ship, the draught across the deck when the scuttles were open and the ship was under way was sometimes great enough to be uncomfortable even in the tropics The mess decks occupy the whole width of the ship a fact of inestimable value in natural ventilation by means of scuttles Right aft, in the wardroom and officers cabins, there was rarely much draught through the scuttles, which mayhap was due to their being within the stream line current of air caused by the ships forward motion Also the fore and aft bulkheads which divide lengthwise the whole of the ship except the forward mess decks hinder the development of cross draughts

I confess that the completely negative result of the wind scoop experiment surprised me, although I had long been suspicious that the one in my cabin did little more than block out most of the light The complete uselessness of my wind scoop was perhaps due to my scuttle acting as an exhaust most of the time of the experiment Although the air supply to my cabin was shut off, yet some 100 000 cubic feet of air per hour was being pumped into the cabin flats and this air had to get out somewhere what way was easier than through scuttles when open? My experiments on scoops and scuttles were too few to dogmatize on but they suggest that the effect of scoops and artificial ventilation on altering the force or direction of air currents through scuttles (and hatches) might be worth a full investigation Also should it be found that in the after part of a long tapering [illegible] under way wind scoops are generally useless they might as well be done away with because scoops are hard to keep clean and merely lumber up a cabin when not in place Even in harbour wind scoops are as often as not put in back to the wind or become so if the ship swings

(4) [illegible] of Motion of the Ship on the Kata-thermometer

The [illegible] with the air [illegible] ventilation [illegible] and inlet [illegible] and from [illegible] was [illegible] appreciably [illegible] than those [illegible] harbour. Though some of these discrepancies were possibly due to technical errors, yet there can be little doubt they may have been caused by the ship's motion, which, besides having a pumping action on the air, made the kata swing on the hook it was usually hung from to take a reading. On one occasion the wet kata thermometer figure was 7·8 when the instrument was kept as still as possible. The instrument was then purposely started swinging on its hook like a pendulum. The air current relative to the thermometer caused by its own motion increased the cooling effect on the instrument from 7·8 to 13·1 millicalories per second per square centimetre of surface. Of course no motion as great as this deliberate swinging could occur in the heaviest sea way, but H.M.S. *Dunedin* knew how to roll and as many of these observations were made during bad weather the possible effect of the ship's movements on the kata thermometer figures is worth bearing in mind.

(5) Mess Decks and Other Living Spaces

On various occasions during the passage home kata thermometer readings were taken on the mess decks. In obtaining these figures the instrument was held four feet above the deck and as far away as possible from the direct draught of a ventilation inlet. Table III summarizes the more important of these records. The boys' and seamen's mess decks were level with the upper deck under the forecastle deck. The stokers and marines lived on the deck immediately below the seamen. The marines and stokers messes were separated from each other by a transverse watertight bulkhead and a similar bulkhead separated the marines from the after part of the ship. In Table III the series of figures marked A show that with everything screwed down the atmospheric conditions remained very good in comparison with the figures for the air on the upper deck. The temperature only went up two or three degrees and there was only a very little rise in absolute and relative humidity. The stokers and marines' quarters, though further removed from the outside air than the seamen's, contained air whose cooling quality was not appreciably worse than the atmosphere of the sick bay and upper mess decks. In the tropics a wet kata thermometer figure between 6 and 8 has often to be endured and in tropical rig is not so uncomfortable as might be expected—although an environment in which the wet kata figure is less than 7 can scarcely be called stimulating.

The figures in series B, Table III, were obtained on a day when no sentries could be carried with the view of comparing the atmospheric conditions of the wardroom with those of the forward mess decks. In the wardroom with the ventilation supply on but the open electric fans

[illegible] the wet kata-thermometer figures were no higher than those observed during the same morning on the mess decks. However, when the [illegible] fans were switched on the cooling effect of the air in the wardroom [illegible] that recorded forward. In the medical officer's cabin the cooling [illegible] of the atmosphere with the fan off, but air supply left on, was considerably less than that found in the stokers' mess. The officers' quarters and forward mess decks are at the extreme ends of a long ship, and almost [illegible] escape the heat from the boiler and engine rooms. Thus the temperature of these places was rarely more than a degree or two above upper deck temperature. In other messes situated nearer the middle of the ship the wild heat from the engines and boiler causes the temperature to rise. In series C, for example, the chief petty officers' and engine room artificers' messes, which were close to the boiler and engine rooms respectively, showed a dry bulb thermometer reading about 10° F higher than that on the stokers' mess deck, but the corresponding rise in the wet-bulb temperature was only half this amount (i.e., 5° F). Also owing to the exceptionally efficient air supply, always found during hot weather in those places occupied by the higher engine room ratings, the kata readings in their messes were as good as those on the forward mess decks.

The beneficent effect of open scuttles is at once evident if series C is compared with D in Table III. In D, although the wet bulb temperatures are higher than in C, yet the wet kata figures are higher in D, because of the cross draughts through the open ports and hatches. Series D gives a good example of the failure of the dry kata-thermometer as an index of comfort as the temperature of the air approaches 95° F. In the E.R.A.'s mess the temperature was 90°, and when the dry kata-thermometer readings were taken the top of the alcohol column would move comparatively rapidly down the first part of the distance, between the 100° and 95° F mark, and then slow up, giving a final reading of 1.6, in spite of the fact that the wet kata-reading taken at the same time was over 12 and the conditions by no means uncomfortable. The rate at which the alcohol descends in the dry kata is quicker the greater the difference in temperature between it and the air. At the beginning of the descent the difference was 100°—90°, i.e. 10°. At the end it was only 5°. The actual limit in using the dry kata thermometer is shown in another observation. In one of the bathrooms the air temperature was 95° F, and the descent of the alcohol in the dry kata thermometer got slower and slower as the lower index mark was approached. Finally, the top of the column came to a standstill on the lower index mark, and refused to cross it because both the instrument and air were now at the same temperature, and no further cooling could take place as long as the bulb of the kata thermometer was dry. At the same time the wet-bulb temperature was 84° F, and when the kata-thermometer bulb was covered with wet gauze evaporation was able to cool the instrument well below the lower index mark of 95°, but of course here, too, evaporation would have failed to carry the alcohol

[illegible] 54° F [illegible] temperature [illegible] on the kata thermometer

The last [illegible] in Table III gives the [illegible] kata readings on the mess decks on arrival in Sheerness. They [illegible] very high, yet the occupants felt very chilly and comfortless. This lack of correlation between human feelings and the kata readings may have been due to the fact that twelve days previously the temperature off Trinidad had been about 85° F dry and 80° F wet, and hence the men may not have had time to get acclimatized to conditions not unusual in home waters.

(6) The Ratio of Cubic Space to Air Supply in Ventilation

Series C in Table III are the most important and interesting of these observations because the atmospheric conditions they define are a testimony of the remarkable efficiency of a cruiser's forced ventilation. The figures were obtained on a hot night in the tropics when heavy rain squalls had forced all hands to sleep below. (In the tropics when the weather permits as many men as possible sleep on the upper deck.) Also the sea was too high to carry any scuttles. Under these circumstances the marines and stokers mess decks depend entirely on the mechanical air supply, because the hatches, which are the only other openings into these spaces, besides the ventilation inlets, act as exhausts. The boys and seamen would get occasional gusts of air down the upper deck forecastle hatch, as the exhaust air from their living spaces usually works aft through sick bay flat and out through the forward screen doors into the waist of the ship. I visited these forward mess decks at 5 a.m. after they had been in full occupation for about seven hours. The stokers mess is relatively smaller for the number of men using it than the others. There were sixty men sleeping in it at the time of my visit. The scene below at night on a cruiser's mess deck almost baffles description. Hammocks are slung from every available hook and stanchion and cross each other in all directions, forming at least two tiers. Men either because they could not find a slinging billet, or because they preferred it, were stretched asleep on the deck and on, or under, the mess tables. The space seemed full of men, but by dint of crawling under some men and climbing over others a space large enough to swing the psychrometer was ultimately found. I worked out roughly the cubic space of the stokers mess deck and calculated, when due allowance was made for men, machinery, lockers, mess traps, furniture and the multitude of other space occupiers that are continually being crammed into a man of war, that there was less than 100 cubic ft. of net air space per stoker, yet, in spite of my having just come out of the open air on the upper deck, the atmosphere felt fresh and the smell of man was scarcely perceptible. The temperature of the mess deck was 81° F., only 3° F. higher than that in the open air, the wet bulb temperature was 77° F. as compared with 73° F. on the upper deck. According to these figures scarcely any water had been

[illegible] the mess deck [illegible] and [illegible] [illegible] (Table [illegible])

The [illegible] power of the [illegible] on the stokers [illegible] was equivalent to [illegible] [illegible] lost per second per square centimetre as indicated by the [illegible] kata thermometer. This figure in my opinion is quite satisfactory for acclimatized [illegible] in the tropics. The cooling figure (8 5) was [illegible] the medical officer's cabin on the same day at 5 30 a.m. with the air supply on but the fan off. (When the electric table fan was switched on the wet [illegible] figure over the head of my bunk was 13 1) The thermometer readings on the stokers mess deck after sixty men had spent the night [illegible] surprised me because greater overcrowding in a space so full of [illegible] was scarcely possible. Therefore I went into the matter rather fully and compared the air supply of my cabin with that on the mess deck. The net air space in my cabin was about 700 cubic ft. From dry kata and temperature readings in the mouth of my supply inlet I found the average supply of air was about 5 000 cubic ft. of air per hour. The stokers mess deck is supplied from a separate ventilation intake on the upper deck by a fan which is designed to deliver 6 000 cubic feet per minute with a free intake and outlet, but according to recent experiments with the ordinary amount of ventilation trunking in place, under average conditions these fans supply 2 000 cubic ft. of air per minute (120 000 per hour), (see A.F.O. 2351 April 7 1928). I think the fan supplying the stokers in H.M.S. *Dunedin* was more efficient than this but I will take 120 000 ft. per hour as the figure to use for discussion.

The net air space on the stokers mess deck was certainly not more than 6 000 cubic ft. The air was therefore changed twenty times per hour, whereas in my cabin it was changed seven times per hour. The air on the stokers mess deck was changed therefore about three times as often as the air in my cabin. Any air which is pumped into a space (the pressure remaining the same) has to get out again and the air pumped into the stokers mess had to find its way out three times as fast as the air in the M.O.'s cabin. Therefore the velocity of the air movements on the mess deck must have been *on the average* three times the velocity of the air currents in the cabin. This fact, that the air on the mess decks *must* escape more quickly than the air in the cabins, supplied the explanation of a phenomenon that had greatly puzzled me. I had noticed that no matter what the weather was, or if the ports and hatches were open or shut, the cooling power of the air on the forward mess decks was almost invariably higher than in the officers cabins when the latter's table fans were turned off. This was the case even if the actual temperature in the cabins was a degree or two less than on the mess decks. That this phenomenon was not due to any special position of the kata thermometer in a localized air current on the mess decks is unlikely as the matter had worried me for some time. I found it did not matter where, within reason, the kata thermometer was put, mess deck readings nearly always gave a higher

cooling figures than those which were taken in other cabins at approximately the same time It was not until I worked out the ratio of the air supply to the cubic space of the compartment supplied that I realized the satisfying explanation that the greater cooling effect of the air on the mess decks was due to the faster air motion produced by a relatively bigger air supply

The average velocity of the air on the mess decks would not be much more than a mile an hour and a draught of warm air at this strength is hardly perceptible At 83° F a dry kata thermometer reading of 4 on the mess deck corresponds to one of about 3 in my cabin, the air velocities that fit these figures are 1 2 and 0·4 miles per hour respectively Thus we are faced with a peculiar paradox—*it seems that it would increase the comfort of men in the tropics to cut down the amount of space they have to live in* Such a hygienic heresy of course only applies when the air supply is not reduced in proportion to the cubic space as only then will diminishing the capacity accelerate the average velocity of the air The action of reducing capacity in increasing velocity may be more easily envisaged by a more simple example If anyone walks through a tunnel, such, for instance as a London tube railway he may encounter a strong wind until he comes to a place such as a station where the tunnel expands, when the wind at once diminishes in direct proportion to the increase in area of the cross section of the tube If the velocity of the air in the narrow part of the tunnel had been twelve miles per hour, and at the station the tube expanded to twice its original diameter (*i e*, four times the area of the cross section), the strong wind at once becomes a light breeze of three miles per hour The same volume of air is passing through the station but since there is now four times as much room the air need only travel at a quarter the pace A man on the stokers mess deck had about 100 cubic feet of space and 3,000 cubic ft of air per hour An officer had seven times the amount of space and more than twice as much air, yet the mess deck felt cooler than an officer s cabin (with fan off) because the air was moving through the mess deck three times as rapidly as through the officer s cabin It is hard to find a greater vindication of Leonard Hill s principles of ventilation than the above figures

(7) Observations in the Engine Rooms and other Working Spaces

Dry bulb temperatures of 130° F or more are frequently reported from the hot places in a ship and those who have to endure these temperatures are often regarded with awe as a species of supermen But in spite of their supposed hardships there is little evidence that these men suffer more often from exhaustion or go sick with greater frequency than the upper deck workers (except in certain places under exceptional conditions) Table IV records the temperature and cooling power of the atmosphere of some of the hotter places in a cruiser The table shows how the temperature rises in the middle of the ship All the temperatures above 90° F in this table

are found in spaces adjacent to the engine or boiler rooms The starboard passage, for instance, is situated between the engines or boilers and the side of the ship The wet and dry bulb temperatures in the starboard passage were both 10°F higher than those of the open air. The increase of temperature was due to the escape of "wild heat" from the engine rooms In contrast, the living spaces right forward and aft, which escape the internal heat of the ship, were only a degree warmer than the open air

Table IV was compiled from figures which were obtained during general quarters, and therefore give an indication of what the atmospheric conditions below would be like during an action in tropical waters The transmitting station is a small compartment which during action quarters may be occupied by fifteen or more men closely packed together The conditions according to the feelings of the workers in the transmitting station were hot and uncomfortable but easily bearable and the wet kata figure of 6 corresponds fairly well with the human feelings. However, in the transmitting station, though the air supply is especially efficient, there was a definite increase in absolute humidity, which had increased from 9·0 to 12·8 gr of water per cubic foot In this case any water added to the air was doubtless from the lungs and skin of the occupants In other places such as the engine boiler and bath rooms, any increase in absolute humidity was largely due to small escapes of steam or moisture taken up from any casual water

Table V gives a few readings which were made in the engine and boiler rooms during a fine day in low latitudes The engines are controlled from the "manoeuvring platforms" and here are situated the telegraphs and communication systems with the bridge and other parts of the ship The engine room is fitted with especially powerful ventilating fans whose inlets are just above the manoeuvring platform There is a desk on the platform where orders and records are entered At this desk, though the wet bulb temperature was 82°F conditions felt cool and fresh and the wet kata was 13·4 a better cooling power than was possible in my cabin (see Table V) On the platform directly under the ventilating fan the wind was so strong that the wet kata figure rose to 26 In fact, in spite of the temperature being over 90°F, standing under the fan after coming from one of the hotter corners of the engine room produced a distinct sense of chill on the sweat covered skin As most engine room watchkeepers even if their main duties keep them in hotter places can get a spell on the platform to cool off, one understands why in ordinary tropical weather heat stroke is uncommon On the day of examination the coolest place according to human sensations, out of the wind on the upper deck was the after engine room manoeuvring platform The forward engine room is considerably hotter than the after one, because the former contains the high pressure turbines, which use steam at a very high temperature which drops as it expands into the low pressure turbines in the after room

The observations in the boiler rooms were made 4 ft above the floor plates about 4 ft from the closed boiler door, where stokers on duty stand. With only the forward or after pair of boilers lit, the other side of the room was comparatively fresh and cool. On the whole owing to the tremendous air supply (forced draught) the boiler rooms are not unpleasant places in hot weather. Records were taken in one or two exceptionally hot places where a man might have to stop for a few minutes to do a short job of work. On a small gallery under the main steampipe as it enters the forward engine-room the wet bulb temperature could not be forced below 100° F, however long one swung the psychrometer, and a wet kata thermometer reading showed 2·1 milli-calories gained per second per square centimetre (i e, the alcohol took about four minutes to *rise* from the lower to the upper index mark on the instrument). Of course in such an atmosphere a man could not get rid of his excess of heat however much he sweated, and no amount of draught would help him, in fact it would make him worse, his temperature would have to go up and he would soon get heat stroke if he stopped any length of time in such an atmosphere. On another grating over the top of No 3 boiler the dry bulb temperature was 130° F, but the wet bulb temperature could be swung down to 91° F and, owing to the high velocity of the air currents, a positive cooling power of 2·3 was shown by the wet kata-thermometer. These last two sets of observations are an interesting contrast, the actual air temperature of the latter was about 10° F higher than the former, but owing to humidity differences heat was lost by a wet surface at body temperature in the air with the higher temperature, and gained by the same surface in the lower temperature. The highest temperatures were obtained in a space between the tops of the two lighted boilers. I found it almost impossible to stop long enough to swing the psychrometer. I could not stay to take a kata reading in an atmosphere with a wet bulb temperature of 115° F. However, the senior engineer told me that he had had a job of work done in this atmosphere by men working in relays for a few minutes at a time. Of course no one could exist in such an atmosphere for more than a few minutes, yet it says a good deal for the adaptability of the human organism that any hard manual work could be undertaken in such a place at all. In Table V it will be seen that the absolute humidity (according to the wet and dry temperatures given) shows great variations, this may in part be due to errors in observation or small escapes of steam in the different places.

I will conclude this section by confessing that some of the engine-room figures are not very reliable. Radiant heat from hot metal surfaces, steam pipes or furnaces, whiffs of escaping steam, and eddies from rapid currents of air at different temperatures supplied by the powerful ventilating or forced draught fans made it practically impossible to get two identical consecutive readings of either psychrometer or kata-thermometer. The records even if not correct for the moment of reading, undoubtedly represent conditions that are about the average taken as a whole, and hence give a fair

[illegible]
[illegible]

[illegible]

[illegible] above [illegible] Dry bulb [illegible] and [illegible] frequently been reported [illegible] which is close to the boilers. As indicated in Table IV, [illegible] quarters on March 2 1921 the dry and wet bulb temperatures [illegible] 92° respectively and the wet kata figure in the centre of the [illegible] This room was intensely hot and uncomfortable but four [illegible] watch here in turn doing light manual work for four hour [illegible] of these switchboard watchkeepers reported sick while I [illegible] they all seemed perfectly fit physically and mentally in [illegible] quarter of their life in the switchboard room. On another day when the temperature was not quite as high some experiments were made in order to show the effect of an air current at high temperatures on the kata thermometer. These records were taken very carefully and are summarized in Table VI. The wet bulb temperature of 90° F was the minimum reading obtained after many swings of the psychrometer in different parts of the room. The point is thus clearly demonstrated that a man can do light work in four hour stretches without showing any signs of distress with a wet bulb reading over 90° F *provided the air motion is great enough*. Whether relative humidity is of importance as regards the comfort of a worker at such high wet bulb temperatures is uncertain. Leonard Hill and Vernon [1] were inclined to think the dry temperature did not matter but later work of Vernon's begins to throw some doubt on this dictum when the wet bulb temperature begins to approach body temperature. In front of the centre of the switchboard about 1 ft above the deck and 5 ft from the fan the wet kata thermometer figure was 19. When the kata was moved so that the bulb was 2 ft in front of the fan the cooling effect increased to 12 b. In the same place with the fan switched off it dropped to 2 6. In the centre of the room with the fan on after the instrument had been cooled to below 95° F the alcohol in the dry kata took 11 seconds to rise from the lower to the upper index marks. This [illegible] corresponds to a heating effect of 4 1 millicalories per second per square centimetre. When the instrument was placed 2 ft from the fan, the breeze increased the *heating* up to 9 8 millicalories. With the fan off, the dry kata figure in the same place was only 3 5 millicalories *gained*. Notice that with the kata thermometer dry and uncovered, a current of hot air at 117° blown on it caused the temperature to rise 5° in less than a minute. The same thermometer covered with wet gauze dropped 5° in thirty seven seconds when exposed to the same draught of air. Thus

[illegible] thermometer had turned a heating effect [illegible] [illegible] These observations illustrate a point of [illegible] tance in therapeutics It is no good trying to cool a feverish patient [illegible] skin is dry (i.e. whose sweating mechanism is exhausted or cut [illegible]) with a blast of air whose temperature is above body heat If [illegible] the patient is wrapped in a wet sheet, air which may be considerably above his own temperature will cool and refresh him This method of reducing temperature and treating heat stroke is probably as good as the usual ice pack recommended in textbooks and can be used when ice is unavailable The evaporation of 1 grm of water abstracts between 500 and 600 calories according to initial temperature whereas the melting of 1 grm of ice abstracts only 80 calories[1] Ice also tends to cause constriction of the cutaneous blood vessels which of course is the last thing wished for when an attempt is being made to cool the blood and tissues

After spending half an hour in the switchboard room I felt very uncomfortable and was glad to get out The watchkeeper however who had been over three hours in the room did not seem to mind showing how acclimatization must play a part in getting accustomed to hot atmospheric conditions The pulse rates of a sick berth petty officer, the ship's torpedo officer and myself were all about 100 per minute the pulse-rate of the watchkeeper was 103 This rise in pulse rate is probably a physiological response in order to drive blood rapidly through dilated blood-vessels of the sweat-covered skin which is the radiator of the human automobile On March 2 on my way into the switchboard room I had stopped to take a reading in the lobby just above it, the wet bulb was 90° F and the wet kata figure 5 3 I had made a note that the atmosphere felt intensely hot and "muggy" After half an hour in the switchboard room I again passed through this lobby my impression then was that it was comparatively cool and fresh This is another observation which shows how undependable human sensations are in estimating atmospheric conditions and the great difficulty of correlating human sensations with instrumental standards of comfort Vernon [2] has recently maintained the importance of acclimatization, and it seems to me as if there were two types of acclimatization A short period type whereby one's first impression of an environment depends on the environment one has just come out of and a long period one, whereby a man gradually gets trained to endure without discomfort a climate which he may have found at first most oppressive It may be mentioned that a few men never seem able to adapt themselves to the heat For example, one of the officers in the *Dunedin*, who was otherwise physically fit and keen on games always complained of the heat and felt fit for nothing at temperatures when the rest of the wardroom

[1] To be fair one must remember one can supply many more grammes of cold water to the patient than it is possible to evaporate from his skin

suffered no inconvenience. Such man's mechanism of acclimatization is probably imperfect, and they should not serve again in the tropics.

(9) Conclusions and Discussion

In the tropics the wet kata-thermometer gives more useful information than any other single instrument regarding the suitability of any air space as an environment for man or other mammals. In certain parts of ships and other spaces where an air temperature over 80° F. is usual the evaporation of sweat is a far more important factor in heat loss than the difference of temperature between the air and the human body, hence the wet kata thermometer becomes a much more reliable index of comfort than the dry. In fact when the air temperature is over 95° F., the dry instrument will only indicate a heating effect, whereas the wet kata at the same time and place may show a heat loss compatible with a fair degree of comfort. Leonard Hill [1] and his collaborators came to the conclusion that the wet kata varied inversely as the wet bulb thermometer irrespective of the dry bulb reading, but more recent work by Vernon [2] shows that the kata thermometer "constant" is not constant at different temperatures and therefore relative humidity probably has more effect on cooling than has previously been allowed. Although anyone who has served in hot climates knows the difference between a wet and dry heat, yet some people are so hypnotized by the magnitude of dry bulb temperatures that they seem to forget all about the wet bulb. For example, if an officer in the wardroom complains of being prostrated in South China when the temperature was only 85° F., as likely as not he will be snubbed by somebody else who boasts that when he was in North Africa he endured temperatures of 110° without turning a hair. Both remarks are of course senseless without mention of the wet bulb temperatures.

In view of Vernon's latest work it is conceivable that at high wet bulb temperature a higher dry temperature may make an environment more bearable than one in which the dry temperature is lower but the wet bulb the same. I am inclined to think that the switchboard room with a wet bulb temperature over 90° F. would not have been so bearable if the air had not been so dry (i.e. relative humidity 38), i.e., if the dry temperature had been lower. This question is interesting as regards the aetiology of heat-stroke, so rare in the Pacific and American tropics compared with the East. More kata figures and temperature records are required from places such as Red Sea and Persian Gulf at times when cases of heat stroke occur, to solve this question which is still in abeyance. However, the answer is most likely to be a simple one, i.e. that higher wet bulb temperatures are more common in the localities where heat-stroke occurs, and that relative humidity, *per se*, has little to do with the aetiology of heat-stroke. But it has yet to be disproved that at certain wet bulb temperatures and air velocities a low relative humidity, which of course means a higher dry bulb

temperature for the same wet bulb reading makes the environment fitter for the human organism

In attempting to correlate such a variable factor as human feeling of comfort with the physical condition of the atmosphere it is impossible to be dogmatic A "pleasant" atmosphere will vary with the personality, acclimatization, clothing, and employment of every individual Leonard Hill suggests that in England for an average standard of comfort the cooling power shown by the wet kata-thermometer should be 18 millicalories per second per square cubic millimetre But in the tropics when the men are acclimatized tropical naval rig (cotton shirt and shorts) always worn and the skin damp, a cooling power of 18 is probably excessive for most people and an unnecessary high ideal to work for As a matter of fact 10 is quite a comfortable figure, and even when the wet kata only registers 7 or 8 conditions are not really so bad as people at home might imagine since no sailor is likely to minimize the hardships of climate he endures to his untravelled friends at home As was seen above the switchboard operators had to spend a quarter of the day in an atmosphere where the wet kata figure was often between 3 and 4 but admittedly this atmosphere was very uncomfortable and such spaces in ships should be improved as soon as possible

A study of the records in this paper shows how much better the cooling power always was on the upper deck Even on a flat calm day the ship's forward motion always creates a pleasant breeze and even when kata thermometer figures in the open air differ little from those between decks the variableness of the upper deck air currents makes the open air fresher and more stimulating than the air below For these reasons in hot weather men should be encouraged to sleep and spend their leisure hours as far as possible on the upper deck The temperatures and humidities given for the open air and spaces between decks in the various tables are convincing evidence that the amount of air pumped into H M S *Dunedin* was more than adequate In addition, the figures show how even when the ventilation inlets were closed the use of table fans increased the cooling power of the air Such observations make me wonder if it would not be better when in tropical waters to pump in less air and use the power so saved in driving more open fans, or other mechanisms designed to increase the velocity of the air currents For example the power of the fan which ventilates the stokers' mess in H M S *Dunedin* is 6 h p Good traversing electric fans need not absorb more than a ½ h p If the power used to supply air was reduced to 5 h p, enough energy would be left over to drive four traversing fans placed in each corner of the mess The experience gained with the old pattern fan in the medical officer's cabin makes it almost certain that such an arrangement for stirring up the air in the stokers' mess would increase an average cooling power of 7 to one of over 10 on the wet kata thermometer Perhaps it might be possible to alter the present types of air inlets so as to produce a "jet" system of

mechanical ventilation, which would cause the air to circulate rapidly round and round the living spaces before going out through the exhausts. It ought not to be a difficult problem for the technical ventilation experts to devise a system with interchangeable fittings, whereby a ship could serve one month in the North Sea with an air supply in which draughts had been reduced to a minimum, and the next month in the West Indies, with each living space converted into a small whirlwind. A good deal more could probably be done in assisting heat loss in the tropics by controlling wild heat by lagging and other methods, and diminishing the absorption of the sun's radiant heat by making better use of side screens, and double awnings. Conditioning the air by dehumidifiers causing a lowering of the wet bulb temperature, or actually cooling the air could be done, but such measures mean the installation of more apparatus needing continual expert supervision and extra labour, whereas increasing the rapidity of the air motion should be less expensive and more "fool proof."

The whole point of ventilation in ships is to use the mechanical power available to the best advantage. Although an effective drop of temperature is the best means of cooling an overheated man, yet the cost of its mechanical production is prohibitive compared with increasing air velocity.

The rate of change of air, or the ratio of, the air supplied to the cubic capacity of a compartment, is a principle in ventilation that has probably been rather neglected because it can have little significance except in ships, and certain factories which use forced ventilation, large complements of men and small compartments. For the same rate of air supply the greater the cubic space the smaller the rate of change of air and the lower the average velocity of the air currents in it. According to this principle in cold climates where draughts are unpopular, rooms should be large enough to permit adequate change of air without perceptible draughts. On the other hand in the tropics where breeze is everything, a small compartment provided the same amount of air is pumped into it as into a larger one may become a blessing in disguise. It is time it was realized that cubic space when uncorrelated with air supply has practically no significance, except in so far as it means floor space, which in turn means the average linear distance between the respiratory orifices of the inhabitants. For the same rate of air supply the amount of air available for the inhabitants of a compartment is just the same, whether the volume of the space is 1,000 or 100 cubic ft. The atmosphere remains just as "pure" in both cases, but in the latter the average velocity of the air currents will be ten times as great. These considerations show how illogical it is to stipulate 600 cubic ft. of air for each inhabitant of a barracks if no mention is made how much floor space is to be allowed each man, or in the case of a dormitory what distance must separate the beds and how often the air is to be changed. If 600 cubic ft. of air is to be allowed to each man, 70 ft. of floor space, a change of air four times hourly, and at least 2 ft. 6 in. distance

between the sides of the beds should also be insisted on. These arbitrary standards (600 cubic ft., 70 square ft., 2.5 linear ft.) are given in the order in which they are most frequently used, but in their reverse order to their importance in preventing the spread of disease. As a matter of fact if 2.5 ft. between beds is insisted on, adequate floor and cubic space of necessity has to follow. In a ship of war these standards are absolutely impracticable; about 150 cubic ft. of air, 16 square ft. of deck, and a single tier of hammocks with no distance between them is about the best that can be aimed at in a modern cruiser. The naval hygienist has therefore to rely almost exclusively on air supply. Space is already so limited that the average linear distance between the inhabitants of a ship can hardly be reduced further, and even supposing that it were possible to increase the deck area per head from 16 to 24 square ft., the linear distance would only increase from 4 to 5 ft. Moreover, the overcrowding and close living together of large numbers of men leads to "salting" or adaptation to the naval bacterial environment, such that further overcrowding, even if physically possible, is unlikely to be followed by an appreciable increase in the morbidity from infectious disease. For such reasons air space at sea becomes scarcely worth worrying about from the medical point of view as long as the rate of change of air is high enough. This high rate of change is required in the tropics for two purposes:—

(1) To provide a sufficient cooling effect by keeping the temperature from rising too high, and water vapour from the lungs and skin collecting and increasing the humidity (*i.e.* to prevent the wet bulb temperature from rising).

(2) To flush out the microbe-laden droplets which float in the exhaled air of the ship's company.

For this reason 2,000 to 3,000 cubic feet of air are supplied per hour per head. The supply is not, as the layman still frequently supposes, to supply oxygen and remove CO_2. Submarine experience shows that more than 2 per cent. of CO_2 can be borne with no untoward symptoms or damage to health, and to prevent the CO_2 rising by this amount a supply of only 30 cubic ft. of air per hour per head would be necessary.

While on this subject another digression may be worth while. I have over and over again asked gas experts why one cannot fit "box respirators" and dehumidifiers on the ventilation trunks and stir up the air with fans when "gas-tighting" a compartment. I suppose there must be a satisfactory answer which is confidential. The only answer I get is the resistance would be too great and take too much electric current wanted for other purposes. I have seen no figures in support of this statement. Do the experts realize that the normal ship's supply is designed to push in 3,000 ft. of air per hour for each man. With air below a certain absolute humidity and stirred up fast enough *only 30 cubic ft. of air* per man would be necessary to keep up the oxygen supply. I scarcely believe excess pressure equivalent to say another 3 in. of water for the filter and 3 in. for a

dehumidified would lower a supply of 3,000 to under 50 cubic ft per hour with the same ventilating fans However I admit I am now off my own ground but I would like to know the answer to the above question[1] It is possible that in the old days the air supply per head in certain parts of the ship was not much more than this 50 cubic ft per hour, as even to-day healthy old North Sea fishermen according to Leonard Hill, wake up in the morning in the sealed down cabins of their trawlers in an atmosphere

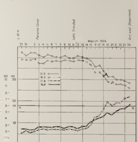


FIG 1 — Shill air figures S M O s cabin

that will not support the combustion of their lamps—equivalent to about 3 per cent CO_2 (M R C Report 52 p 128) I am not advocating cutting down the air supply to a ship because for reasons already given an abundant supply of air is healthy and necessary as a routine, but in cases of emergency in war the amount of air could be cut down to $\frac{1}{10}$ of the present

[1] Since writing the above I believe the problem has been satisfactorily solved by Mr R C Frederick demonstrator in hygiene R N College Greenwich

supply if the air is kept moving and dry (It does not even need to be dried in cold weather.)

The dry bulb temperature cubic capacity, and CO_2 percentage are most misleading indices of the suitability of an atmosphere as a human environment and should be discarded in favour of the wet bulb temperature and kata thermometer figures, or used in conjunction with them The naval health officer, who has been brought up ashore to worship the goddess Fresh Air when she occupies thousands of cubic feet and reposes placidly in spacious halls, when he goes to sea must submit his goddess, just as plump afloat as ashore to the indignity of being squeezed in indecent haste through narrow pipes and pokey compartments Nowadays as it becomes necessary to pile more and more gear and machinery into ships the living spaces of the men get more and more encroached on so that a ship's medical and executive officers are at times scared that there may not be enough air left for the men to live on Such a dread is superfluous because as long as the supply of air remains the same and the men have enough room left to stand up in, they will get exactly as much air of the same degree of "purity," the only difference being that the air will have to get out more quickly and hence have a greater cooling power, which may be advantageous or not according as the ship is in a hot or a cold climate

This paper has no pretensions to being the last word on kata-thermometers in ships It was written partly in the hope it might stimulate other medical officers to collect records from all types of ships serving in all sorts of climates Even though the records from H M S *Dunedin* are not too accurate or numerous, they clearly confirm Leonard Hill's principles of ventilation, and demonstrate the paramount importance of applying these principles in hot climates to the environment of one of the densest populations in the world—a modern man-of-war The *Dunedin* experience has convinced me that the kata thermometer is the most simple and reliable single instrument for testing and controlling the atmospheric environment of sailors Also so efficient is the forced air supply of H M ships at the present time that I am sure that with no further expenditure of power or money a warship's living spaces and ventilation system could be so designed that in whatever part of the world she was serving simple manipulation of the supply and motion of the air could when required prevent the dry kata figure exceeding 6 or the loss of millicalories per second per square centimetre being less than 10 from the wet kata thermometer

REFERENCES

[1] HILL, LEONARD Medical Research Council Special Reports Nos 32 52 73
[2] VERNON, H M Medical Research Council Special Report No 100

These Reports contain a vast mass of information on ventilation and should be studied by all naval medical officers

A CONVENIENT CHART CLASSIFICATION OF LACTOSE-FERMENTING *BACILLUS COLI* (MacCONKEY'S TESTS) FOR USE IN THE BACTERIOLOGICAL EXAMINATION OF TROPICAL AND SUBTROPICAL WATER SUPPLIES

By Surgeon Lieutenant Commander A. F. ROBINSON, R.N. (Retd.)

During 1911-12 MacConkey's [11] separation tests were made use of in the examination of coliform organisms obtained from water and other sources at Malta. This method had been shown to be of importance in the study of surface waters in India by Clemesha [1]. The change in the type of *B. coli* found in water during storage in India was considered to be largely due to the effect of tropical sunlight on the coliform organisms present. As the naval water supplies of Malta were not exposed to sunlight during storage it was considered that it would be of interest to determine the type and rate of change under these conditions. Coliform organisms from stored water, spring water, human fæces, dust, rain, sea bird excreta and mineral waters were examined by means of MacConkey's separation tests so that in all well over 1,000 organisms were classified. The chart classification was drawn up to facilitate the consideration of the possible elimination of certain of the standard tests, so as to simplify the procedure when a large number of samples have to be dealt with.

MacConkey in 1909 employed the following biochemical tests. Fermentation, i.e. production of acid and gas in the following bile salt media (I-IV): (1) saccharose, (2) dulcite, (3) adonite, (4) inulin, and in addition the (5) indole, (6) "carbinol" (Voges and Proskauer reaction), (7) motility, i.e. seven tests. Excluding the production of acid without gas in tests 1-4, there are two possible results for each test, i.e. + or −. The number of variants possible $2^7 = 128$.

The number in each of MacConkey's four groups $\frac{128}{4} = 32$.

MacConkey's			MacConkey's		
Group I	Saccharose −	Dulcite −	Group III	Saccharose +	Dulcite +
„ II	Saccharose −	Dulcite +	„ IV	Saccharose +	Dulcite −

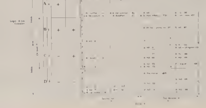
As the result of the examination of 497 lactose fermenting bacilli from various sources (178 from human fæces), MacConkey found:—

		Some described by other observers
8 variants belonging to Group I	B. Nos. 1-8	B. Nos. 9-11
4 „ „ „ II	B. Nos. 33-36	B. Nos. 37-41
11 „ „ „ III	B. Nos. 65-75	B. Nos. 76-86
13 „ „ „ IV	B. Nos. 97-109	B. Nos. 110-117

No. 101 *B. gasoformans non liquefaciens* in MacConkey's Table 1, *Journal of Hygiene*, 1909, is not differentiated from the *B. lactis aerogenes* subgroup by the seven standard tests.

Chart I

ANALYTICAL CHART SHOWING FERMENTATION REACTIONS OF LACTOSE FERMENTING B. COLI



Bergey and Deehan (1908) [3], in a system of classification of the colon-aerogenes group (which does not include the preliminary test of positive lactose fermentation) made use of one additional test, the liquefaction of gelatin, thereby increasing the number of variants to 256. These are divided into sixteen subgroups each containing sixteen possible members.

For the examination of the types of lactose + *B. coli* in water supplies in tropical and subtropical regions the following chart presents a convenient arrangement. In water which has undergone self-purification there is in general —

(1) A relative increase in the saccharose-fermenting type of *B. coli* due to (*a*) The appearance of indole negative "carbinol" positive types—*B. lactis aerogenes* and *B. cloacae* which are saccharose fermenters (*b*) and to indole negative, "carbinol" negative types in MacConkey's saccharose positive Groups III and IV.

(2) Early disappearance of Group II organisms of the *B. coli communis-schaefferi* type.

If we employ the division of lactose + *B. coli* into indole positive (excretal type) and indole negative (non-excretal) and hence give all "Lagin"[1] *B. coli* organisms the same significance we may, as pointed out by Glemesha [4], fall into the error of condemning water containing relatively high counts of resistant type, i.e., grünthal-vesiculosus subgroups of "Lagin" *B. coli*.

Method of Construction of Analytical Chart of Lactose fermenting *B. coli* from MacConkey's Table

Organisms belonging to MacConkey's Groups I to IV are shown from left to right. These four groups are divided into (1) The indole positive ["Lagin" *B. coli*] A and B Groups, and (2) the indole negative C and D Groups, B and C being "carbinol" positive. This arrangement gives sixteen squares. If we consider the fermentation of adonite and inulin as additional tests and use the same notation (+ –) (+ +) &c. as has been adopted for the A, B, C, D Groups, calling each in order α, β, γ, δ, four possible subgroups appear for each square.

Subgroups α and β are adonite positive, β and γ inulin positive, while δ is negative to both tests, giving sixty four subgroups.

By use of the motility test each of these subgroups is doubled. MacConkey describes eight types differing only in motility. In the chart the motile organism is placed first in the adonite and inulin grouping.

The chart position of the *B. coli communis* may be designated—II A δ (m). The *B. schaefferi* subgroup as II A δ (n m).

[1] Lagin *B. coli* (Houston) [illegible] production of acid and gas in lactose, indole positive.

II indicates MacConkey, Group II, *i.e.* Saccharose −, Dulcite +
A Group A, *i.e.* Indole +, "Carbinol" −
6 Group 6 *i.e.*, Adonite − Inulin −
m motile and n m non motile.

The biochemical reactions given by the classical strain of *B coli communis* (Escherich) being as follows —

Lactose	Saccharose	Dulcite	Adonite	Inulin	Indole	"Carbinol"	Motility
	−	+	−		+	−	+

The *B coli* *verus* differing only as far as these tests in the absence of motility.

The *B lactis aerogenes* IV, C, *a* (n m) and *B cloacae* organisms IV, C, *b* (m) are thus separated from the *B coli* class. It is easy to see at a glance the chemical relationship of the various MacConkey subgroups.

Organisms found in water undergoing purification due to storage (rare in human faeces 5 per cent) are to be found in the right-hand lower quadrant. Organisms in the right upper quadrant are "angus" *B coli* (Houston) *i.e.*, saccharose positive indole positive.

A considerable number of organisms giving subgroup reactions were found at Malta which were not listed in MacConkey's table. Other observers have also had the same experience. We have given provisional numbers to these subgroups and indicated their chart position in thin type. Sub-groups described by MacConkey (*Journ of Hygiene* Table 1 p 94, vol ix 1909) are shown in *thick* type.

The named or numbered organisms in MacConkey's table may be considered as each representing a subgroup the use of further biochemical tests such as raffinose and salicin leading to further differentiation.

O before a subgroup in Chart I indicates that non-lactose fermenting bacilli having the same subgroup reactions have been described. Cp Table XXVII Medical Research Committee 5th Dysentery Report (Glyn, Robinson &c.)

United States authors [11] (Rodgers Clark, Lubs and Levine) have indicated the points in favour of the separation of the "carbinol" positive, high gas ratio $\frac{CO_2}{H_2}$ 1 e 2 7, *B aerogenes*—*B cloacae* group. Chart classification B and C groups from the low gas ratio $\frac{CO_2}{H_2}$ − 1 06 Carbinol negative coli group, *i.e.* chart classification A and D groups.

Correlation of Gelatin Liquefaction in the A, B, C and D Groups.

The use of gelatin liquefaction as a primary test seems to be out of the question, owing to the length of time required for the test. MacConkey [11] states that "in most cases liquefaction of gelatin took place very slowly. It is possible that some of these put down as non liquefiers might have given a positive test if they had been kept long enough." *All were kept for two to three months.*

Chart 2

Chart showing type of Lactose fermenting B. coli found in human Faeces From the Examination of 2800 Colonies According to MacConkey's Separation Tests

(Motility Test Not Used)

GROUP			GROUP. I. MAC CONKEY	GROUP. II. MAC CONKEY	GROUP. III. MAC CONKEY	GROUP. IV. MAC CONKEY	TOTAL	
A	+		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
B	+	+	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
C	-	+	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
D	-		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
			42.7 %	23 %	15.4 %	18.7 %	100	100%

It is evident that the exclusion of gelatin liquefiers from the coliform group from the sanitary bacteriologists point of view must be correlated with the fact that such organisms are not typical of those isolated from the human intestinal tract If we examine MacConkey's Table I, *Journ of Hygiene* vol ix, April 1909, we find that out of the thirty-six types (sub groups) of coliform organisms described ten subgroups gave a positive test to gelatin In all *eighty* bacilli belonging to these gelatin positive sub groups were isolated If we divide the *source* of the organism into (1) fæcal (2) non fæcal or remote fæcal we find that in Class (1) 2·7 per cent of the organisms found liquefied gelatin and in Class (2) 51·4 per cent

If we consider the position of the gelatin liquefiers in Groups A B C and D (chart classification) —

	A		B		C		D		
	Indole +	"Carbinol" −	Indole +	"Carbinol" +	Indole −	"Carbinol" +	Indole −	"Carbinol" −	
Gelatin liquefaction	0		8		60		12		Total 80

i e, none of the gelatin liquefiers came from the (indole + "carbinol" −) Group A

Stewart [15], 1918 in an investigation of the coliform organisms infecting the wounds of war, describes the biochemical reactions of forty eight lactose fermenting (acid and gas) bacilli twelve of which liquefied gelatin Ten gave a positive "carbinol" reaction (10 in Group C and 1 in Group B)

One however, which liquefied gelatin belonged to the A Group B No 106—coscoroba subgroup Chart classification **IV A** δ (m) Serial number (Stewart) 30

In general one may state that coliform organisms which ferment lactose give a positive indole reaction and a negative "carbinol" test do not liquefy gelatin

Chart II shows the type of lactose-fermenting *B coli* found in human fæces from the examination of 2,100 colonies according to MacConkey's separation tests (motility test not used)

The figures are obtained from the following sources —

(1) Archibald [1] (Egypt)	30	(6) MacConkey [11] (England)	178
(2) Castellani [3] (Ceylon)	104	(7) Robinson (Malta)	150
(3) Clemesha [4] (India)	1 206	(8) Med Res Committee, No V Dysentery Report (Mediterranean)	104
(4) Hirst [8] (Ceylon)	250		
(5) Houston [9] (England)	88		

Note Adonite + Inulin − α Adonite − Inulin + γ
Adonite + Inulin + β Adonite − Inulin − o

ANALYSIS

[illegible] subgroups [illegible] classification II [illegible] [illegible] 17 [illegible] In MacConkey's Group II [illegible] per cent [illegible] [illegible] faeces belong to these subgroups [illegible] organisms isolated belong [illegible] Group A [illegible] indole [illegible] The distribution of organisms [illegible] which did [illegible] being as follows —

I	[illegible]	B [illegible]	123
II	[illegible]	B coli communis—B schafferi	464
III	[illegible]	B No 71 B neapolitanus	453
IV	[illegible]	B No 101 — B coscoroba	266

1,726 = 82 1 per cent

Th[illegible] motility test has not been included in the separation tests as the authors from whom the majority of these figures were obtained did not include this test

Consequently in the subgroups it has been necessary to group the motile and non motile organisms together The first-named or numbered organism in each subgroup is the motile one, thus *B coli communis*, motile *B [illegible] schafferi* non motile

The chart shows that of non-saccharose-fermenting *B coli* 65 8 per [illegible] are the common type in human faeces The term, *B coli communior* applied to saccharose fermenting *B coli* is evidently a misnomer Durham [illegible] suggested the use of this term if they were found to be the more common type

The percentage of carbinol positive organisms = 6 23 per cent, and [illegible] these 96 9 per cent fermented saccharose

TABLE SHOWING PERCENTAGE OF A, B, C AND D GROUPS GIVEN BY LACTOSE FERMENTING *B coli* FROM DIFFERENT SOURCES

[illegible]	Indole	Carbinol	Human faeces Chart II	Faeces MacConkey England	Other sources MacConkey England
A	+	–	91 9 per cent	91 6 per cent	37 5 per cent
B	+	+	1 5	0 8	5 1
C	–	+	4 6 "	5 5	43 3 "
D	–	–	1 9	1 9 "	13 8
	Saccharose fermenters		34 1 per cent	19 5 per cent	82 3 per cent
	Number of colonies		2 100	361	136

[illegible] Durham 1900 *Journ Exp Med* p 872 referring to organisms like those of the [illegible] series which fermented saccharose suggested that the term [illegible] might be used for this class as he considered it possible that this type might [illegible] more inhabitant of human faeces than the non saccharose type (*B coli communis*) [illegible] the case it might be distinguished from the Escherich type as *B coli* [illegible] More recent work however indicates that saccharose fermenters are not so [illegible] the saccharose negative type.

Non-Lactose Fermenti[illegible]

While the so-called paracolon organisms [illegible] lactose fermenting *B. coli* are comparatively rarely [illegible] of the white colonies turn out to be late lactose f[illegible] organisms of this type have been shown by Clemesha [4] [illegible] responsible for the high ratio of positive glucose ferment[illegible] to those of the lactose tubes in water in India which has underg[illegible] purification (*loc. cit.*)

The chief coliform organisms which are responsible for this [illegible] in India have been denoted by Clemesha as *Bacillus* "P" which [illegible] indicates a subgroup differing only from *B. cloacae* as far as MacConkey's tests indicate by the absence of lactose fermentation.

E.g. *B. cloacae* subgroup chart classification IV C 8 (m)
Bacillus "P" (NLF) IV C 8 (m)

NLF = non lactose fermenter

Classes	Lactose	Saccharose	Dulcite	Indole	Carbinol	Adonite	Inulin	M[illegible]
B. cloacae	+	+	−	−	+	−		
NLF *Bacillus* "P" (Clemesha)	−	+	−	−	+	−	−	
		IV		C		[illegible]		[illegible]

In tropical water supplies these subgroups are frequently found t[illegible] We have found the *Bacillus* "P" subgroup organisms under the same conditions in water at Malta. Hust [8] has had a similar experie[illegible] in Ceylon. In England, non lactose fermenters are also found in water during storage. Houston's [9] experiments in England however indicate that the *Bacillus* "P" subgroup does not predominate in the manner found in tropical and subtropical waters.

Table showing Comparison of Types of N[illegible]-lactose fermenting *B.* [illegible] found in Human Fæces (320 Colonies) with those found in Water during Storage in England by Houston (215 Colonies)

MacConkey	Human fæces[1]	Water (England) Houston	Chart	Indole	Carbinol	Fæces	Water (Houston)
	Per cent	Per cent				Per cent	Per cent
Group I	62 3	18 9	Group A	+	−	91 2	32 2
" II	13 0	4 2	" B	+	+	0	0 4
" III	9 9	4 8	" C	−	+	0 9	15 9
" IV	14 8	41 6	" D	−	−	7 7	41 6

[1] Non lactose fermenting *B. coli* in human fæces: Clemesha (1) (150 colonies), 4th Medical Research Committee Report, Glynn, Robinson, &c. (171) and Malta (Robinson) (19).

[illegible] an approximation to the group percentages obtained [illegible] *B coli* in *human fæces* (Chart II). Note the higher [illegible] positive and indole negative types in water as [illegible]. The 'carbinol' positive groups in water reach [illegible] tropical and subtropical water supplies the "carbinol" [illegible] higher. Clemesha (India), Hirst (Ceylon).

[illegible] of lactose does not affect the relative chart [illegible] *B coli* obtained respectively from fæcal and non-fæcal [illegible].

[illegible] the question of obtaining a 'figure of merit' for the [illegible] broth fermentation tubes has been investigated by [illegible] [14], who has published a convenient table giving the most [illegible] *B coli* per 100 c c of sample corresponding to [illegible] results. Greenwood and Yule [16] have also [illegible] formula and table for the calculation of the "most probable number" of bacteria. In this way by the reading of the positive tubes (acid and gas) we get a figure giving the 'most probable number' of *B coli* present. A further reading of all tubes in which growth is present ([illegible] of whether gas production is positive or not) will give a [illegible]" for the number of organisms growing in the medium. We are in agreement with Hirst [8], as regards the elimination of the [illegible] fermentation test for colonies under examination. Certainly 99 per cent of the red coliform colonies ferment lactose in liquid media with gas production and it has been pointed out that the other tests employed give an indication of the probable source of the coliform organisms under examination.

By the routine use of the indole, 'carbinol', saccharose and dulcite tests the chart position of the organism under examination indicates the necessity or otherwise for the application of further tests.

From the result of these four tests, the chart classification may be defined as in one of the sixteen small squares. For example say A I or IV D. Reference to Chart II shows that out of 2 100 coliform organisms isolated from human fæces 881 were placed in chart position A I and only four in chart position IV D. From a sanitary bacteriologist's point of view the most significant grouping is in the order A, B, C to D.

With regard to MacConkey's groups, Groups I and II are more significant than III and IV and of these Group II is the most important, containing as it does the *B coli communis*, *B schaefferi* subgroups.

Briefly Clemesha places the following subgroups in three classes:—

Class I. *B coli communis*, *B schaefferi* and *B oxytocus perniciosus* i e organisms feebly resistant to storage.

Class II. Intermediate; *B acidi lactici*, *B coscoroba*, *B neapolitanus* and *B lactis aerogenes*.

Class III. Very resistant; *B grunthal*, *B vesiculosis* and *B cloacæ*.

Inoculation [illegible] three [illegible] (1) peptone water (2) saccharose peptone water with [illegible] tube but without indicator[1] (3) dulcite litmus peptone water may be used in the following manner —

Fermentation is usually evident in the saccharose tube by the appearance of gas. If this test is negative the "carbinol" test may be eliminated as a routine procedure. A positive "carbinol" test in the *absence* of saccharose fermentation is very unusual (Charts I and II). On this account glucose peptone water inoculation is not necessary if it is desired to eliminate some tests.

If saccharose fermentation is positive apply the "carbinol" test to the *saccharose* tubes by the addition of solid KOH (1 grm for 5 c.c.), shake from time to time to promote oxidation and leave in boiling water bath for a few minutes.

The peptone water tube may be used for (a) determination of motility, morphology and Gram stain. The determination of motility being particularly important to separate the *B. coli communis* and *B. schafferi* subgroups.

(*b*) For the inoculation of the saccharose and dulcite tubes, and for the adonite and inulin tests when necessary.

(*c*) For the indole test (reserve test).

The indole[2] test may be applied to the dulcite tubes when a final reading has been taken whether the test is positive or negative or to the negative saccharose tubes by the following method. Add a small quantity of ether, shake, allow to separate, pour the Ehrlich reagent carefully down the side of the tube so as to form a layer between the ether and peptone water. If the test is negative the peptone water culture should be used as a confirmatory test.

In tropical countries benzene or an ether benzene mixture may be used instead of ether; if separation does not readily occur on standing, a drop or two of alcohol will be found useful. If the reagent is added directly to the culture media, it is advantageous to increase the HCl concentration over that given in the books for the Ehrlich formula, on account of the buffering action of the peptone.

As the concentration of saccharose (½ to 1 per cent.) does not appear to inhibit indole production, one has frequently demonstrated the presence of indole in a saccharose tube showing a positive "carbinol" test by the addition of ether as above described, i.e. organisms Group B.

Owing to the high cost of adonite, it is in general desirable to confine its use to those cases where special information is required.

The adonite test may be used if desired for organisms giving chart

[1] If litmus is used as an indicator in small amount it does not interfere with the "carbinol" test, the litmus being quite bleached by the alkali on heating.

[2] Reference to indole test: Medical Research Committee Dysentery Report (Glynn, Robinson, &c.)

[illegible] (I, II, III, IV) A also in chart grouping (IV C) in order to [illegible] between the *B lactis aerogenes* and *B cloacae* subgroups It [illegible] from the chart that a positive test *lessens* the significance of [illegible] organisms placed in chart grouping (II, III, IV) A whereas [illegible] ping adonite fermentation indicates the *B lactis* subgroup, [illegible] n shown by Clemesha in India to have more significance than [illegible] of the grunthal vesiculosus subgroups so that the [illegible] the organism in this case as indicating recent fecal pollution [illegible]

The [illegible] test may be eliminated as a routine procedure, as it is rarely form[illegible] by coliform organisms whether obtained from fæcal or non fæcal sour[illegible]

In chart grouping III B a positive inulin test is strong presumptive evidence that [illegible] *coccus perniciosus* subgroup is present and in that case the adonite test may be withheld

In conclusion we hope that these suggestions may prove helpful to sanitary bacteriologists in the Services

[Some of the data from which this paper was written were published in the Medical Research Committee 5th Dysentery Report (1918), and Chart II was published in a skeleton form in the Medical Research Council Special Report Series No 51 (1921) p 12]

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[12] McCrady *Journ Infect Dis* 1916 183

[13] Nicol *Journ Hyg* Cambridge 1911 381

(14) Rogers Clark Lubs and Levine *Journ Infect Dis* 1915 1918

[15] Stewart *Journ Hyg* Cambridge 1918 xvi No 3

16 Greenwood and Yule *Ibid* Cambridge 1917 54

DESCRIPTION TO CHART 1

[illegible] TING *B. COLI* NOT LISTED IN [illegible]

	No [illegible]	I	[illegible]	α	(n m)	Clemesha (4 [illegible]
	No 10	I	[illegible]	γ	(m)	Clemesha No 10 [illegible]
	No 11	I	[illegible]	α	(p)	Johnstone (10) No 18 [illegible] No 50?
I	No 12	I	[illegible]	[illegible]	[illegible]	Johnstone No [illegible] No 12?
	No 13	I	[illegible]	[illegible]	(m)	Robinson, No [illegible]
	No 14	I	[illegible]	[illegible]	[illegible]	Archibald (1) Colo [illegible]
	No 15	I	B	[illegible]	[illegible]	Frith 71 No 11
	No 37	II	Bor [illegible]	[illegible]	(n m)	Clemesha No [illegible] [illegible]
	No 38	II	B	α	[illegible]	Clemesha No 48
	No 39	II	A	γ	(m)	Clemesha No 97
	No 40	II	A	β	[illegible]	Robinson (Malta) [illegible]
	No 41	II	A	γ	[illegible]	Robinson (Malta) [illegible] tank water [illegible]
II	No 42	II	B	δ	[illegible]	Robinson No 97 [illegible] as MacC [illegible]
	No 43	II	A	α	[illegible]	Robinson No 135 [illegible] MacC [illegible] Archibald [illegible]
	No 44	II	C	α	[illegible]	[illegible]
	No 45	II	B	[illegible]	[illegible]	[illegible] No [illegible]
	No 76	III	L	[illegible]	[illegible]	Houston Table IV Johnstone [illegible]
	No 77	III	C	β	(m)	Robinson [illegible] Bergey and Deehan No 295?
	No 78	III	B	β	( )	Robinson [illegible] Bergey and Deehan No 218?
	No 79	III	B	β	(m)	Robinson (Malta) [illegible] tank water [illegible]
	No 80	III	A	β	(m)	Robinson (Malta) [illegible] tank [illegible]
III	No 81	III	D	α	(m)	Robinson (Malta) [illegible] reservoir water [illegible]
	No 82	III	D	γ	(n m)	Robinson [illegible] MacC [illegible]
	No 83	III	D	δ	(n m)	Robinson [illegible] water
	No 84	III	B	δ	(m)	Archibald [illegible] and [illegible]
	No 86	III	B	δ	(n m)	Stewart 36 No 13
	No 85	III	A	ε	(m)	Archibald [illegible] Bergey [illegible]
	No 110	IV	D	γ	(m)	Clemesha No [illegible] Robinson [illegible]
	No 111	IV	B	α	(n m)	MacC [illegible] Table IV Houston Stewart No 24 [illegible]
	No 112	IV	D	α	(n m)	Hunt [illegible] well [illegible] and [illegible] Johnstone [illegible]
IV	No 113	IV	B	γ	(m)	Robinson Bergey and Deehan [illegible]
	No 114	IV	B	δ	(m)	[illegible] well [illegible]
	No 115	IV	[illegible]	δ	(m)	Hunt Table II Stewart No 18 Robinson
	No 116	IV	B	δ	(n m)	Robinson [illegible] MacConkey 109 [illegible]
	No 117	IV	[illegible]	β	(m)	Archibald [illegible] No 91

Remarks — A ? has been placed after organisms [illegible] by Bergey and Deehan [illegible] whether the [illegible] organisms described by these authors belong to lactose [illegible] lactose *B. coli* group.

AN [illegible] THE COMPLETE ASSESSMENT OF PHYSICAL FITNESS[1]

[illegible]

I [illegible] the human machine three separate conditions have to be con[illegible] (A) The fitness for the ordinary duties of life as estimated by the [illegible] clinical examination (B) The nature of that fitness whether high or low as assessed by certain auxiliary tests, not usually included in (A) (C) The likelihood of that human machine breaking down in the future.

(A) is always [illegible] usually the examination is not carried out with the idea of mak[illegible] of prognosis as to the future (B) is sometimes considered (C) is usually not done in conjunction with (A) and (B) in estimations of fitness, at the present time The present methods of assessment of the bodily fitness of a human being are compiled chiefly with the object of investigating the working of the body as it stands before the examiner This is not sufficient A question of importance to answer is How long is this body likely to run well without a breakdown ? The answer to that question will enable us to make a good bargain when choosing either a workman or recruit

Physical fitness is usually considered to be an ability for strength and endurance only but is often confused with skill or cleverly performed and controlled co ordinated muscular movements This is an error Real bodily fitness is a condition which entails a certain state of mental intelligence as well, which enables a man to comprehend his environment, and by means of his powers of endurance and agility he can either take advantage of the conditions of his environment or elude them The brain must start the body on the right course, and when once there then excellence of endurance and agility will win the day The brain also controls the body and therefore stability of nervous control is also an essential of fitness If it is required to prove a man fit to do strenuous exercise the best test for him is to submit to that exercise and see how he gets on It will then be found out whether the heart and lungs do their work properly as well as the rest of the body The efficient performance of work involves all the systems of the body, and these systems are so complex and so subjected to adaptations and fluctuations that no one or two tests or measurements can be infallible guides Even the temperature and moisture of the surrounding air will effect this human machine and make it react differently Success in athletics depends on qualities such as skill, which are not at present actually discoverable by any test, except actual

[1] Paper read at the Royal Institute of Public Health Congress at Ghent, June 1 to 6 1927 (Published by kind permission of the *Journal of State Medicine*)

trial at the sport or occupation in question but the actual bodily fitness can be assessed satisfactorily if the tests mentioned below are applied. Having proved that his physical fitness is of high degree, the next point is to ascertain if he is capable of carrying out the special duties required, such as flying, engineering, typewriting, playing the piano, or success in athletics. This function of skill in manipulation is quite a different process to that of fitness. Physical fitness depends on the excellence of the general reactions of the whole body, whereas skill in manipulation and success in gymnastics depends on the centre which controls complicated muscular movement and is situated in that part of the brain named by Professor Elliot Smith the neopallium. What may affect one may not necessarily affect the other, and although as a general rule manipulative skill depends on physical fitness a fit man may have no skill, or vice versa.

It follows therefore that in occupations involving manipulative skill the only way to assess them is to see for instance how the man flies, works at his trade, hear how he plays the piano or performs at gymnastics. That is, the centre in his neopallium must be tested. Owing to a fault in this centre a man may be clumsy at everything in spite of high physical fitness. That it is necessary as far as possible to test the physical fitness of a man, which includes the stability of nervous control, before he is let loose in a dangerous occupation, can be judged by the fact that no one would allow an untested man to fly. He must be physically fit, not clumsy, and have nervous stability. The mistakes he may make in the air after that assessment will be reduced to a minimum. Every safeguard will have been taken before he actually flies. This is where the usefulness of accessory tests comes in, but the flying will be the actual and final test, whatever the preliminary accessory tests may have been. That is how employers of labour choose their workmen, namely by a month's trial of the work they are going to do, not by a month of accessory tests.

(B) Auxiliary Tests

The following are the principal tests which have been employed to assess physical fitness: Weight and stature (chest circumference, stem height and total height). The pulse rate after resting and after a set of mild exercises (including the pulse ratio). Rate of respiration. Vital capacity. Holding the breath. The U Tube manometer test, the test for expiratory force. Pulmonary ventilation. Blood pressure.

(The following tests are mentioned here so as to make the list complete, but my general remarks do not refer to them: The reaction time test. Tests used in the Royal Air Force such as the power of self balancing, the balancing rod, tremors of the eyelids and fingers. Tests for the eyes such as the converging test, the cover test, colour vision, and the diaphragm test.)

Before proceeding I would like to add two tests which I think are of importance. When the pulse is being tested after resting and after exercise the respiration should also be noted and counted. A good "wind" depends chiefly on the co-ordination between the heart and the lungs, and

[illegible] will [illegible] the value of the tests. When the respiration is [illegible] it is usual to find that the heart is tested as well but the reverse is not so often the case. One experiment will suffice to illustrate my meaning. If a man is subjected to endurance tests for the pulse and responds normally for several days this sequence may be broken by giving him a pint of beer a quarter of an hour before the next test. What will be noticed most is that after the endurance test, especially if it involves the mounting of stairs, the man will be breathless. This breathlessness is often missed if the heart alone is counted. The other test is a careful observation of the eyelids and movements of the eye muscles. Tremor should be absent. In a man who is fit the upper eyelid is well retracted and nearly out of sight. The natural movements of the eyeballs as he looks about will be very brisk and the eyes will be bright. Combined with these signs there will be an air of alertness and anticipation about the man. There will be a look of eager expectancy on his face caused I believe by an interest in the proceedings and by a desire to anticipate if he can anything that may be required of him during the examination so as to be ready to respond. Before passing on it may be mentioned here that his hair should be healthy looking and naturally glossy and the skin firm and not moist and slack.

In a man who is unfit or failing, his upper eyelid will be more prominent than usual, his eyes will be dull and the movements of the eyeballs comparatively slow. There will be no interest or eagerness to respond, the general appearance giving one the impression of a child at the onset of an illness. The drooping of the upper eyelid in exhaustion is well illustrated in "Exercise in Education and Medicine" by Tait Mackenzie where a cast is depicted of an athlete's face as exhaustion is coming on. Here the eyebrows are raised as high as possible in a last endeavour to prevent the upper eyelids from falling over the eyeballs before the tape is reached. These slow movements of the eyeballs can I think be explained.

In his "Evolution of Man" Professor Elliot Smith describes how the acquisition of the stereoscopic vision and the delicate and complicated muscular movements which the eye is capable of are responsible for our progress beyond the lower animals, and our adoption of the erect position. The mechanisms by which these eye movements are controlled are a comparatively recent acquisition and if the nerve centres and nuclei governing such movements conform to the general law of centres they would be the first in the body to feel the effects of exhaustion or a toxin. Hence their early appearance and significance in fatigue. Again Professor Elliot Smith says that one of the most significant changes that took place in the advancement from the prosimian to the simian stages in other words the changes that mark the acquisition of stereoscopic vision, is the splitting in two of the nucleus of convergence of the eyes so that each eye can be focussed independently on any object, such as objects when seen obliquely, and not straight in front of one's face. The advantage of this is that two

sharply defined and exactly focussed images can be obtained even if the object is seen obliquely, and is therefore further away from one eye than the other. Therefore the animal is not compelled to move its head as the larama does. I think that this nucleus which has split and taken on a new function might also be affected very early by exhaustion or toxins with a consequent early loss of the power of focussing an object when seen obliquely. Tests are being carried out on these lines, but at present there are not sufficient data on which to make a statement, but there is sufficient evidence to show that some conclusions may be drawn up and that this failure of focussing an object (when held at one side or other of the head) with both eyes simultaneously is a very early and important sign of the onset of general fatigue and unfitness. I suggest also that one of the methods of induction of hypnotism may also be connected with a disturbance in this recently divided and delicate nucleus which causes a reflex inhibition in the brain. An object such as an eyeglass is held level with the eyes at a distance of two or three feet. The patient is made to look at it and keep his eyes fixed on it. The glass is then fairly slowly advanced to a point midway between the eyes. When it gets to an inch or so away from his forehead the glass is swept down over the nose. At this moment the patient goes to sleep. From my own experience the convergence of my eyes and the altering focus of each eye causes a sensation of confusion just as the glass gets within an inch or so of my nose. The sweep downwards over the nose causes the eyelids to drop and that is the moment when this artificial sleep may be induced. This method of using an eyeglass was taught me by Dr Hurst. The effort of this newly divided nucleus causes a disturbance and its power is inhibited by being unable to focus as the glass gets close to the nose, and this inhibition spreads as a wave to the rest of the brain. This newly divided nucleus is very easily influenced. I have no experience of the tests under the heading of R A F but when I saw them demonstrated at the Medical Headquarters of the R A F in London, I understood that they were used principally as tests for that essential of physical fitness especially for a manipulator namely, stability of nervous control. The following general remarks do not refer to these R A F tests.

As all the above experiments are delicate ones it should follow that slight disturbances would upset them. This is so.

For instance, it does not follow that because a man has a normal vital capacity before taking exercise that he would have a normal one after it. A common cold will upset these tests. Alcohol does also. To be of value the above tests should be taken together as a whole. One test alone, except the pulse rate, is of very little value, and might lead to serious error. Failure in the heart tests alone is very suggestive of a man being unfit or ill. Failure in the heart test and one other pronounces a man unfit. Failure in any two other tests (barring the heart test) pronounces a man unfit or very much below the average. Athletes will pass all the

tests, but [illegible] common as the [illegible] hurdles. Thus, by using all the tests, the unfit man will not be included with the fit. A man with abnormal weight or vital capacity does not often fail in other tests.

Weight and Stature (Chest Circumference, Stem Height and Total Height).—The standard works on measurements of the human body are Roberts' Manual of Anthropometry, Quetelet's tables in his Anthropometrie, Treves' Physical Education, which is published in a treatise on Hygiene and Public Health (Stephenson and Murphy). In these there are tables which show average and mean height, average and mean weights and chest girths. Also the relation of weight and height and chest circumference. Dryer's tables also help. These measurements by themselves do not convey much information of the required sort, although they may be helpful, but physical fitness cannot be measured with a tape.

The Testing of the Pulse.—This is the most valuable and reliable of all the tests. A pulse of 78 and over in a person of average body weight after the subject has rested for some time, indicates that a man is unfit or unwell. The pulse after a set mild exercise should be rapidly approaching the normal resting rate at the end of the second minute after the exercise has ceased. A pulse of 110 or over at the end of the second minute indicates unfitness or ill health. If the pulse at rest is counted (say 60), and the pulse for the first two minutes after the cessation of a set exercise is counted (say 100 the first minute and 80 the second) and these two added together 180, then 180 divided by 60 gives the pulse ratio. A pulse ratio above 3.5 is not found in fit persons. The disadvantage of the pulse-ratio test is that if a man has a high-rate resting pulse which is an adverse factor it will give him a low pulse ratio (perhaps about 2), which gives an entirely false impression. The better and simpler method is to count the pulse for the first two minutes after a set mild exercise. This test is not reliable after such prolonged exercise as a cross-country run. A failure in a heart test is an almost certain indication that a man is unwell or unfit. A man who fails in a heart test will be found in nearly all cases to fail in one or more of the other tests. Then there can be no doubt as regards his unfitness, and the more he differs from the normal in heart tests the more of the other tests will he fail in.

A slow pulse is normally found in all athletes. Heavy men have also a slower pulse than light men. A man over 12 st. has a pulse usually under 70 at rest. In a man of 9 st. the pulse is often over 70. These exercise tolerance tests for the heart are a good guide also for estimating nervous and cardiac stability.

These tests would, I believe, go some way to prevent early invaliding from heart trouble, as they would bring to light a feeble heart with incipient disease, otherwise undetectable.

The Mercurial Manometer Test.—The general opinion seems to be that this is not a test by itself of physical fitness. Hambly and McSwiney say that the results vary greatly, and that some fat or unfit men can perform

this test better than others. Hambly, Pembrey and Werner say, "This is not a test for physical fitness, but suggest that in some measure it may be a test for sensitiveness to discomfort." The same remarks can be applied to the test of holding the breath.

Vital Capacity.—I long ago gave up estimating the vital capacity or taking chest measurements with the idea that they would give me any indication of a man's physical fitness by themselves. If a man has a lesion of his thoracic wall or its contents his vital capacity and chest movements may be impaired. A vital capacity larger than normal for a body means nothing. A somewhat smaller vital capacity than normal (about 10 to 15 per cent. smaller) means nothing in the estimation of physical fitness unless some other defect is found. A vital capacity of 15 per cent. below normal for that body would suggest some abnormality, but not necessarily an abnormal physical fitness. Efficient respiration or physical fitness is not brought about by a large capacity of the thorax, nor by an abnormal mobility of the chest, nor by large volumes of oxygen pouring into the lungs. Large volumes of air passing in and out of the lungs unless the circulation can carry the oxygen to the tissues are of no more use to the body than large volumes passing over the skin.

To enlarge the thorax to make room for more air and ignore the physiology going on inside the thorax, including that of circulation, is akin to enlarging the abdomen to make room for more food ignoring the process of digestion. Increased pulmonary capacity does not mean an improved wind, and is no evidence in itself of a man's power of endurance or resistance to disease. A good "wind" depends on the co-ordination of the heart and lungs, and is best brought about by graduated runs, which cause natural and deep breathing, and teach a man unconsciously to adjust his circulation, respiration, pulmonary ventilation and glandular activity. The process which stops exercise is not a deficient entry of air or oxygen into the lungs under normal circumstances, but the inability of the circulation to carry sufficient oxygen to meet the needs of the tissues, and to eliminate waste products. A point to remember is that this inability of the heart and circulation to carry always sufficient oxygen is met by the body's ability to go into "oxygen debt."

All exercises devised to enlarge the thorax by direct force and leverage, such as some members of the *span bend* group, have been abandoned in the Royal Navy. In some of these exercises the middle of the dorsal curve of the spine is placed on a fulcrum, and direct force and leverage is applied to the body to straighten out this dorsal curve. The idea being that as the dorsal curve is straightened so the anterior ends of the ribs are raised, moving the sternum further from the spine. This is supposed to increase vital capacity. The result of such exercises is rather to increase the lumbar curve, and to pull on the pleura and other contents of the thorax, causing what I usually term a "drag" on these organs, and this drag leads to symptoms amongst which irritable heart may be one. If the tissues

carrying the cardiac nerves are pulled on reflex symptoms occur. During the time that the position of the *spun bend* is maintained the chest is cramped and moved with difficulty. Any movements of the arms during a breathing exercise restrict the movements and expansion of the thorax and prevent the diaphragm from descending. The arms are very heavy and are pivoted on the chest in their movements. Hence the thorax has to be fixed to support their weight and to form a firm basis for the muscles extending from the chest to the arms, from which basis the muscles can act. In order that the thorax can be steadied while the arms move, the abdominal muscles contract and fix the chest. The moment the arms are raised the abdominal muscles will be seen to contract. This prevents the descent of the diaphragm. The arms should be kept still. (See the author's papers in *British Medical Journal*, October 3, 1925, Journal of the Royal Naval Medical Service, October, 1925, January, 1926, October, 1926.)

If it is desired to increase a poor vital capacity, the best way to do it is by graduated runs out of doors. The natural deep breathing after the exercise will do all that is required in a natural way. There is no normal vital capacity for everyone, neither is there a normal appetite for food for everyone. Each has his own and that can only be found approximately. Everyone in the world sees three or four times a day what an appetite is like and how it varies and the standard becomes fixed in the mind and no attempt is made to increase the entry of food into the body by enlarging the abdomen. On the other hand, no one sees the normal amount of air breathed in and out of the lungs or its variations, therefore there is no fixed or normal standard in the public mind and everyone tries to enlarge the chest.

(C) The Likelihood of the Machine Breaking Down

If anyone had to choose a machine for the Navy, he would not only investigate the working of the machine at the moment but would go into its past history and the type. He would also investigate its inherent defects and the length of time the machine or its type would be likely to work without a breakdown, or in other words how it would wear. If we wish to form an opinion and prophesy as to how long a human body may work without a breakdown, it would be wise perhaps to turn to those whose daily task it is to solve this problem, namely the medical assessors of the Insurance Companies and see what standards and methods they have adopted after many years of experience. Insurance business firms usually rely for success on their ability to choose good lives for their ordinary premium, to discover risky lives and guard themselves by a higher premium and to reject "bad lives," and so the medical assessors are accustomed to this form of prognosis. The sudden breaking down of the human machine through inherent defect when controlling an aeroplane, or causing a submarine to dive, may lead to disaster, and this should be

[illegible] possible Besides [illegible] human body [illegible] expensive [illegible] The term [illegible] a [illegible] and in [illegible] at present of telling when a breakdown is likely to occur for certain

We can tell to some extent when a human body may be inherently defective but to do so with confidence and reliability requires experience The following points are the more important ones, which bear on this prognosis

Disproportionate Height and Weight—From an insurance point of view the best height is from 5 ft 7 in to 5 ft 9 in, and the further away from these measurements the more undesirable is the insurance The best weight for the above heights are from 10 st 8 lb to 11 st 8 lb, and the further away from these weights the less desirable is the insurance The National Fraternal Conference Committee (America) came to the conclusion that longevity depends largely on build and the greater the variation from the average 5 ft 7 to 9 in the greater the risk Great height and low weight are adverse factors Extremes of weight are not good lives, especially if excessive weight is due to abdominal obesity An abnormally tall man even if well built is not such a good life as one of medium height Tables are used by insurance companies showing the average weight for stated heights Rapid changes in weight are adverse factors Emphysema with over weight is very adverse A weedy man is not likely to stand strain A weight much below the average for height could only be accepted as fit under the following conditions A reliable family history that this condition is a family peculiarity and that his mother and father brothers and sisters are the same, and all alive and healthy There should be a general appearance of alertness and well being the eyes should be bright and active and have no tremors of the lids The hair should be healthy looking and glossy A man much under weight with a dull subdued expression and dull hair is not fit

A 20 per cent deviation of weight either way, from the normal is the utmost limit allowed, and even then the candidate must be otherwise peerless both in himself and his past and his family history If 100 men with weights 10 per cent below normal were examined together, 50 per cent of these would be found to be abnormal in some other respect There are several chronic diseases which do not give easily ascertained symptoms or signs at an examination which produce light weight Two important cases are a hidden tubercular focus and syphilis For these reasons weediness appearance and the likelihood of some hidden disease do not make a man of this type a good bargain

Tubercle and Light Weight The following are adverse factors A personal history of pleurisy or a family history of consumption with a light weight are bad If such a case has been exposed to heavy infection, and subjected to stress and strain then the prognosis is worse Such a man may

[illegible] lun, the signs of which are [illegible] emphysematous tissue These [illegible] pulse and a low blood pressure. The rapid pulse [illegible] associated with a high blood pressure It must [illegible] in this condition may have had sanatorium [illegible] unt to breathe properly, and has a temporary [illegible] A history of hæmoptysis is always a bad one [illegible] investigated so should also a "stomach" or [illegible] influenza of some duration followed [illegible] may be tubercle Indefinite histories of attacks of [illegible] suspicious also if there is a history of the man being [illegible] A man with a history of phthisis and of light weight [illegible] other infections badly The only conditions under which a [illegible] family history of tubercle could be looked upon as reasonably [illegible] he should have lived a healthy life, that he is over 35 or 40 [illegible] has not recently been exposed to heavy infection Questions [illegible] is to the occurrence of meningitis or abdominal tubercle [illegible] A statement that a death was due to prolonged pneumonia [illegible] often covers phthisis, so does "congestion of the lungs" A [illegible] death from "child-birth" or confinement is a common one, and [illegible] causes including tubercle If a definite history can be [illegible] such as death "after hæmorrhage" or in a week after fever [illegible] cleared up But frequently the death is found to have taken [illegible] months after the event when tubercle is likely Bronchitis [illegible] a history of phthisis A careful history of attacks is [illegible] Pain in the chest may be due to phthisis pleural adhesions, [illegible], angina, dilatation of the heart or spinal disease &c Enlarged cervical glands or scars from their removal are looked upon as tuberculosis It is of extreme importance that the apices of the lungs should be carefully examined the bases equally so

Family History—This is often a stumbling block When a proposer for insurance or a recruit is questioned on this subject, he seems overwhelmed by confusion and loss of memory Important events and their sequence together with dates are all forgotten A question should be put to the recruit as to his liability to any complaint This often unearths something unsuspected, as eczema neuralgia and so forth, which may give [illegible] to some hidden diathesis This question is looked upon as being of [illegible] importance A question as to previous insurance and rejection is [illegible] Even if accepted the examiner should be on guard, as extra [illegible] other safeguards may have been taken by the company A recruit's [illegible] as an athlete is also helpful There should be a special question [illegible] with accidents, injuries and operations, and in all cases their dates [illegible] location complications and after-history stated It should be remembered that there is an inheritance of old age, also of early death In inquiries about former illnesses ask what doctors attended them, the dates

of attendance, and what the attendance was for Recruits and proposers for insurance think it necessary to minimize former illnesses A man who has never been ill is not looked upon as a better life than a man who has had one or two acute ordinary illnesses and completely recovered The duration of the illness should always be stated Recent illnesses are always important The most important point as regards family history are —

(1) Consumption (2) Arterio sclerosis, *i e*, Bright's disease angina pectoris, gout, syphilis and apoplexy (3) The resemblance of the proposer to the long-lived or short-lived members of his family Epilepsy and insanity are detrimental factors A tendency to rheumatism would be shown by the history of any of the following *e g* growing pains, attacks of tonsillitis or quinsy, chorea urticaria, erythema circinatum night terrors, habit spasms, wasting and pallor In fact a history of the "usual childish complaints" other than mentioned above should lead to questions about scarlet fever or scarlatina, and a search for albuminuria or the results of otitis media and heart trouble The same care should be taken with a history of whooping cough and typhoid and their complications Great weight and importance is attached to all these weaknesses and hereditary tendencies

Heredity —A family history of tubercle with a light weight in the man, Bright's disease nephritis, gout with its action on the arteries also dropsy which may mean kidney, heart or liver disease are important Congenital syphilis should be remembered The condition of the blood vessels should be noted A history of long lived or short lived ancestors is of the greatest use and importance Habits of ancestors equally so Tubercle has been mentioned above If more than two cases of cancer are known to be in the family the risk is greater Nervous diseases run in families Also lunacy and epilepsy

Syphilis is important It should always be remembered that disappearance of symptoms does not mean eradication of the disease Syphilis and strain lead to aortic regurgitation Examine the blood vessels No one would be accepted for insurance for three years after the initial sore and an increased premium would be demanded for the next ten years No one acquiring syphilis after 40 would be accepted A cure might be considered to have taken place if after fourteen years there had been no recurrence the Sigma test negative and several healthy children had been born Tabes and G P I must be eliminated A family history of "paralysis" often means G P I or arterio-sclerosis Examination should be made for congenital syphilis and arterio sclerosis Similarly locomotor ataxy spinal paralysis, spastic paraplegia should suggest the possibility of congenital syphilis in the proposer

Death from Heart Failure —This covers a multitude of sins The nature and duration of this disease should be ascertained, as to whether it was rheumatic or possibly due to arterio sclerosis which is held to be

[illegible] under the same heading [illegible] Men who [illegible] by an [illegible] be found to have a very low exercise [illegible] By gross disease I mean such conditions as [illegible] dilatation which may cause oedema, dyspnoea, or [illegible] special attention is paid to the heart sounds themselves [illegible] the usual signs of certain forms of early [illegible] discovered. The heavier thumping boom of [illegible] is changed into one which more resembles the [illegible] The spacing of the beat also alters, the spacing [illegible] equal like that between the ticks of a clock [illegible] at the apex compared with the aortic second [illegible] altered. The blood pressure is low. These [illegible] to a simple lack of tone as well as from the [illegible] A man with a cardio-vascular defect finds it [illegible] thirty seconds. Palpitation must be investigated [illegible] variety of causes, those which would hinder the [illegible] dilatation of the heart, valvular disease [illegible] and alcohol. In heart sounds a murmur always [illegible] something, and its assessment for evil or otherwise depends partly [illegible] the experience or bias of the examiner. Many systolic murmurs are of [illegible] vital importance. A heart must always be examined both in the upright and recumbent postures. A mitral stenosis for instance might only reveal itself after exercise or in the recumbent position. As regards cardiac irregularities, sinus irregularity and some forms of extra systoles are of no importance. All the others are uninsurable.

Alimentary Canal.—Dyspepsia in young people may be the forerunner of phthisis; in the middle-aged the aftermath of alcohol. In old people it may be due to early cancer. A history of dyspepsia is very difficult to elucidate. A man with prolonged albuminuria, or sugar in urine, may quite easily imagine himself to have been dieted for dyspepsia. A man with heart trouble with a little temporary giddiness now and then and pain in the middle of his body may also be quite unaware of his condition and call it dyspepsia. The other causes of dyspepsia are more easily discovered and more often thought of by the examiner.

Respiratory Diseases.—Asthma and bronchitis run in families, and a history of them in a man should lead to an examination for emphysema, palpitation or embarrassed heart. Emphysema with over-weight of the body is a very adverse factor. Tubercle has been mentioned above. A history of pneumonia, especially if prolonged, necessitates a search for tubercle results of empyema or bronchiectasis. Occupations have an important bearing on respiratory troubles. The gassing which occurred in the war caused great disability but few signs.

Alcohol.—The term total abstainer must be qualified. A man may have

[illegible] for a week before [illegible] for fear of being [illegible]. [illegible] of time should [illegible] who take two glasses of [illegible] and [illegible] night whisky and sodas a day may both describe themselves as [illegible] drinkers. The exact daily dose and nature of the fluid taken should be set down. The same principles apply to tobacco although in 1926 (*J. et al.* May 32) work was carried out which tends to show that neurasthenia and irritability lead to excessive smoking, and are not probably caused by tobacco. Occupations have well known effects on health.

Blood-pressure.—This measurement and the diseases in which it may vary need not be mentioned here. From a physical fitness point of view the systolic pressure should be between 120 and 180, better 120 than 180. Diastolic pressure should be about 80. A man is unwell or very unfit if it is under 70. At 50 he faints. With a blood pressure of below 110 and a suspicion of tubercle the machine will probably not work for long. A low blood pressure usually means tubercle and a high blood pressure kidney and cardio vascular trouble. The blood pressure of course varies with the age.

Albuminuria has been found to be present in 16 per cent of schoolboys after heavy exercise. Severe physical exertion will also produce it in adolescents. This albuminuria which disappears after a few days' course of calcium, and which then gives a clear biochemical renal test, can be looked upon as harmless.

Glycosuria.—After a meal containing sugar the amount of blood sugar present in a diabetic is maintained above the threshold line. It may fall slowly after about three hours. There are cases in which a perfectly healthy man shows sugar in the urine up to an hour after a meal. The blood sugar momentarily goes over the threshold line. These cases are not diabetics. If a man has temporary sugar in his urine and has other symptoms, such as affection of the lens or irritating skin lesions, the case requires to be watched. There are yet other cases in which there is persistent sugar in the urine but the blood-sugar never reaches the threshold line, or anywhere near it. These are not diabetics but are cases of renal glycosuria. The blood sugar is abnormally low and the presence of the sugar is due to leakage. A man may be unaware that he has sugar in his urine and ascribe the diet given to him in a former illness to indigestion. A man may also be on a diabetic diet and taking insulin and conceal the fact.

Clinical and Practical Notes.

TORSION OF THE SPERMATIC CORD

By Surgeon Commander I. F. WOODRUFF MINETT

During the last few years I have met with three cases of torsion of the spermatic cord in which case of diagnosis and physical signs have varied to a great extent and I venture to think a few notes on these cases may be worth recording. All three cases occurred in young officers and are the only three cases of this condition I have ever actually seen

Case 1.—G. N aged 30 This was a case of recurring torsion and diagnosis was not arrived at until he had had half a dozen attacks

History.—Patient joined the ship in which I was serving early in 1921, and a few weeks afterwards whilst on watch in harbour, suddenly collapsed He had severe pain in the right lumbar region which radiated to the right testicle and collapse with small rapid pulse, vomiting, and cold sweats were marked The testicle itself was retracted, but not tender or swollen, and appeared normal He gave me a history of several similar attacks during the previous two years He had been sent to hospital and was also seen by several doctors both naval and civilian in these attacks and they had all told him he had a stone in his kidney The acute attack lasted about eight hours was relieved by morphia and was succeeded by a dull aching pain in the right loin I made a diagnosis of renal colic and sent him to hospital X ray and urine examination were negative, however, and he was discharged to duty

About six months later another precisely similar attack occurred, under the same conditions I was quite convinced it was renal colic but as the ship was in foreign waters he remained on board Urine was negative

A third attack occurred at a much shorter interval On this occasion, however there were signs in the testicle, which was both swollen and very tender The attack passed off, as the previous ones had done but some swelling of the testicle remained, and I had now made up my mind that this was a case of recurring torsion of the spermatic cord I advised operation and he was anxious to have anything possible done to prevent any further attacks which were very severe as regards pain

Operation was carried out in the Marine Hospital at Copenhagen The right testicle was found to be rather small with some degree of hydrocele, and very movable the gubernaculum being absent The tunica vaginalis was inverted and the testicle fixed in the scrotum by suturing the tunica to the scrotum

No further attacks occurred after the operation and I followed the case for some years

Case 2.—S. N., aged 25 Was sent to hospital in March 23 with diagnosis of *obstruction acute abdomen* He had been suddenly seized with acute pain in the right testicle while in a submarine and gave a history of having fallen down a hatch and strained himself on the previous day The right rectus was rigid and collapse and vomiting present On examination however the diagnosis was quite clear of acute torsion of the right spermatic cord The right testicle was in the scrotum acutely tender and swollen and the twist in the cord just above the globus major could be felt Operation was immediately performed The cord was found twisted from within outwards just above the globus major The testicle was purple and swollen The twist was easily reduced and the testicle soon regained its normal colour The tunica vaginalis was opened and the funicular process was found patent This was ligatured and removed and the

stump anchored upwards and outwards under the internal [illegible] muscle. The conjoined tendon and muscle were sutured to Poupart's [illegible]. The parietal layer of the tunica vaginalis was removed and the testicle [illegible] to the scrotum.

Case 3.—H. H., aged 29. Was sent to hospital for observ[illegible] [illegible] *hydrocele*, in November, 1926. Had been suddenly seized that morn[illegible] [illegible] pain in the left testicle. When admitted the pain had nearly gone and [illegible] disappeared only rather smaller than normal and slightly tender and very [illegible]. There was no evidence of either hydrocele or varicocele. Diagnosis of torsion of the spermatic cord was made, but operation was declined in this case.

The first noted case had deceived several medical men, and certainly in the early attacks exactly simulated *renal colic*, the signs in the testicle not being evident at all.

In the second case the diagnosis was perfectly clear. I am indebted to Surgeon Captain E. C. Sawdy, R.N. (retired), for permission to publish the notes on this case.

The third case was evidently slight and short lived. In only one case was there any evidence of injury or strain. The testicles had descended into the scrotum in all cases.

TWO SURGICAL CASES

By Surgeon Commander F. J. GOWANS, R.N.

(1) Acute Amoebic Dysentery Complicated by Acute Appendicitis.

R. G. D., aged 23, was admitted to H.M. Hospital ship *Maine* on the evening of August 13, 1927, with the following history. An attack of diarrhoea, commenced on August 11. At first this was not severe, and he did not seek medical advice. On the night of August 12 he had a severe attack of abdominal pain accompanied by vomiting. He reported sick the following morning and was given 1 oz. of castor oil. On the afternoon of August 13 he again had acute pain in the abdomen, accompanied by tenderness and rigidity in the right iliac fossa, and was discharged to the *Maine* by the medical officer of his ship as a case of acute appendicitis.

On admission he was tender over the right iliac fossa, especially over McBurney's spot, and the muscles were definitely on guard. The pain was increased by extending the right thigh and leg. Rectal examination revealed a tender spot high up on the right side. Temperature 100·8° F.; pulse [illegible]. Acute appendicitis in addition to whatever was the cause of the diarrhoea was diagnosed, and it was decided to operate immediately.

Operation.—On opening the peritoneal cavity it was found to contain [illegible] clear fluid, and both the caecal and appendicular peritoneal coats were [illegible] injected. The appendix was removed and, on account of the diarrhoea, the stump was buried by two purse-string sutures in place of the usual single purse-string. The peritoneal cavity was swabbed out with gauze and the wound completely closed in layers. On examining the appendix the whole mucosa [illegible] was found inflamed and contained two patches of necrosis, each the size of a split [illegible]. One quarter of an inch from the tip was the seat of a previous attack [illegible] he had no recollection of such an attack. The bowels acted the following morning, the stool containing blood and mucus. The diarrhoea was kept in check by morphia until the laboratory report was received stating that *Entamoeba histolytica* and cysts were present. Treatment by hypodermic injections of emetine and, later, tabloids of bismuth and emetine iodide soon cured the

[illegible] interrupted [illegible] to [illegible] ship or [illegible] red neither [illegible] cysts in the stools

[illegible] The diagnosis of appendicitis [illegible] often complicated on this [illegible] fact that during the [illegible] weather attacks of abdominal pain [illegible] frequent and often these are accompanied by definite tenderness [illegible] " in the right iliac fossa In this case the diagnosis, and [illegible] to operate was clinched by the presence of the very tender [illegible] the right side of the rectum

(2) RIGHT AND LEFT PERINEPHRIC ABSCESS IN THE SAME PATIENT

H W C aged 21 was admitted to H M hospital ship *Maine* on June 13, 1927, with a history of general malaise and loss of weight for about one month During the fortnight before admission he complained of weakness and pain in the back The pain being of an aching character worst in the right loin, and extending downwards to the right testicle The temperature was of a swinging nature rising as high as 10[illegible] F in the evenings No history could be obtained of any attack of acute pain in the loin or abdomen.

On admission Temperature 102 6° F pulse 72 respirations 22 The patient looked ill abdomen was normal In the right loin a small swelling could be detected, and there was tenderness in the region of the right kidney Urine was alkaline, loaded with phosphates, and contained pus cells and a few red corpuscles No *Bacillus coli* found but staphylococci were present X ray of kidney region gave no evidence of calculus either in kidney or ureter A blood count gave a leucocyte count of 16 000 of which 80 per cent were polymorphs By June 15 the swelling in the right loin had increased in size and operation for perinephric abscess was decided on

Operation on the right side —Oblique lumbar incision gave exit to about a pint of pus which had not the odour of a *B coli* infection The kidney was not enlarged, and no stone could be felt The wound was partially closed and a large rubber drainage tube was inserted to the depths of the abscess cavity The pus gave a pure growth of *Staphylococcus albus* He felt much better after the operation, his appetite improved and he put on weight in spite of his continuing to pass pus in his urine and to run a swinging temperature However on July 16 he had an attack of severe pain in the left kidney region shooting down into the groin and was tender over that kidney He continued to suffer from attacks of pain in this region at intervals but no definite signs of an abscess could be found On August 15, for the first time an area of dulness was found in the left loin and during the following days this was found to be very gradually spreading The wound in the right loin was quite healed by this time, and by August 22 the signs definitely indicated a left perinephric abscess

Operation on the left side Oblique lumbar incision gave exit to about one pint of pus As in the previous operation there was no odour of *B coli* the kidney was not enlarged and no signs of a stone could be found The wound was partially closed and a large rubber drainage tube was inserted to the depths of the abscess cavity The pus gave a pure growth of *S albus*

His condition steadily improved His temperature never rose above normal appetite very good and weight increased The urine became free from pus and organisms and the wound was completely healed by October 18 He was discharged to "light duty" on November 2 feeling well and with both scars firm and strong

Commentary —" Perinephric abscesses result from bacterial infection of the perinephric fat and are usually secondary to some ulcerative or tuberculous disease in the kidney or ureter Less commonly, the perinephric tissue is infected from other sources for example as a sequel to appendicitis typhoid ulceration of the intestine empyema, vertebral tuberculosis or pelvic cellulitis in women

(*Thomson and Miles*) In this case I consider the primary cause to have been a blood borne (hæmatogenous) staphylococcal pyelitis as he had staphylococci in the urine and the pus evacuated from each abscess gave a pure growth of *Staphylococcus pyogenes albus*. The staphylococci probably gained access to the blood stream from some overlooked and trivial *pustular* infection of the skin. No history of that condition having been present could be obtained, but during the hot weather in China small pustules of the skin are extremely common in fact one might say with safety that everyone suffers from "pimples" of some sort at one time or another each hot weather season.

FIVE SURGICAL CASES

By Surgeon Commander J. M. A. HOLMES, D.S.O., M.B., F.R.C.S.Edin.

In his Presidential Address on "Professional Opportunities of the Service Medical Officer" at the meeting of the War Section of the Royal Society of Medicine, our Director General Vice Admiral Arthur Gaskell said "It might be thought that in large service hospitals while there was quantity of clinical material there was not quality, but this was quite a mistake." An account of the following conditions treated in the R.N.H. Plymouth within the space of a few weeks I think, will substantiate this statement.

Carcinoma of Colon

Patient, aged 49 was admitted to hospital on July 16 1927 complaining of pain in his right side of two months' duration. He had not felt well for the previous twelve months, appetite poor diarrhœa alternating with constipation on several occasions he had passed blood and mucus in his stools and had lost weight. Patient was pale and looked ill abdomen pendulous a few distended venules on the skin under left costal margin abdominal wall moved well on respiration. A hard rounded tumour occupied the umbilical and right hypochondriac regions edges well defined very tender, it did not move on respiration and extended up under the right lobe of the liver. The abdomen was opened by a horizontal incision below right costal margin, and a tumour involving the hepatic flexure of colon the size of a Jaffa orange was found. The omentum was firmly adherent to it; these adhesions were ligatured and divided. The tumour was attached to the abdominal wall by plastic lymph which was easily peeled off without causing hæmorrhage. The gut was clamped and divided well above and below the growth which was excised and an end to end anastomosis was performed between the lower end of ascending colon and distal end of transverse colon which fortunately was very mobile. Considerable hæmorrhage was encountered during the above manipulations. The patient after a very stormy convalescence in hospital owing to a *Bacillus coli* infection of the parietes made an apparently complete recovery, and he was discharged to duty on September 30.

Laboratory report: Typical adenocarcinoma of colon.

Rupture of Stomach

This patient, aged 30, was admitted to hospital on August [illegible] with a history of being struck on the back three days previously by a plank which pressed the stomach against a neighbouring oil drum. Although feeling very ill he did not report his accident until three days had elapsed.

On Admission.—He complained of severe pain in the upper part of the epigastrium and was unable to retain any food bowels had not acted for three days face pinched and anxious temperature 99.2° F. pulse 99, respiration 22. The abdominal wall was practically motionless on respiration.

Abdomen [illegible] rigid and tender [illegible] in region. Operation [illegible] immediately and on opening [illegible] free blood stained [illegible] a subperitoneal haematoma [illegible] gastro-hepatic omentum [illegible] colon and the duodenal [illegible] fixture was brought [illegible] small [illegible] region was found and [illegible]

Patient's [illegible] and he died on August 5, 1927, when a post mortem [illegible] two fingers breadths [illegible] oesophagus just proximal [illegible] opening with the stomach contents exuding from this [illegible] cavity.

[illegible] Rupture of Pancreas, Fractured Left Clavicle

Patient, aged 25, was [illegible] to hospital on August 4, 1927, with a history of having fallen off [illegible] the previous afternoon, and of having been dragged along the ground [illegible] distance, the wheel of the tractor had partially gone over his abdomen.

On Admission.—There was [illegible] fracture of the left clavicle, and signs of free fluid in the abdominal cavity, but as the patient had not recovered from the shock an operation was not proceeded with immediately. Next morning, as his condition had not improved, the abdomen was opened when it was found to be full of blood which kept welling up in a most alarming manner. Spleen, liver, kidneys and alimentary tract [illegible] and found to be intact, and finally the pancreas was found to be ruptured at the point where it lies opposite the vertebral column. The patient's condition was now very critical, so a large drainage tube was placed over the seat of the rupture and gauze packed around the tube and the abdomen rapidly closed. Contrary to all expectations he made a most satisfactory recovery [illegible] bile escaping in diminishing amounts from the drainage [illegible] Finally the wound healed and he was discharged [illegible] October 10, 1927, with a good functional result as regards his left clavicle and [illegible] ruptured pancreas.

[illegible]

History.—This patient reported sick [illegible] H.M.S. [illegible] of September 21, 1927, complaining of pain in the epigastric region, and was discharged to R.N.H. [illegible] month on the same day, and admitted to the medical section. He said that his symptoms commenced about the middle of August, '27, and he complained of the fact that his stomach felt as if there was a raw place in it. This sensation came on about four hours after a meal, lasted about three hours and was relieved by vomiting. The vomit was very acid and foul smelling.

Examination.—An ill defined palpable tumour in epigastric region under left upper rectus abdominis muscle was noticed. No enlargement of liver or spleen was detected. Fractional test meal gave an absence of free HCl, and was very suggestive of new growth.

X-ray Report.—Stomach shows a large residue, about three quarters of the meal being present after six and a half hours. A large filling defect involving the whole of the pyloric antrum causing obstruction, only a small amount of the meal passing through, the part is fixed. Remainder of stomach, cardiac end and body movable. Tone and peristalsis normal. Appearance strongly suggests neoplasm involving pyloric end of stomach.

It was considered that there was a remote possibility that surgical intervention might benefit the patient's condition. An exploratory laparotomy was performed on October 10, when a large nodular growth was found infiltrating the distal half of the stomach which was adherent to the transverse colon. The mesenteric glands were enlarged, the mesenteric lymphatic vessels were dilated and visible. Owing to the fixity of the stomach the only thing possible was an anterior

gastro enterostomy, which was done. This operation relieved the patient's pain considerably, but he became steadily weaker and died on October 23, eighteen days later.

Carcinoma of Colon

History.—Patient, aged 31 years, was attending sick bay in H.M.S. *Concord* for three months prior to being sent to R.N.H., Malta, from where he was invalided to England on June 17, 1927. He complained of indefinite discomfort in the region of pelvic colon, and was inclined to constipation.

Examination.—Facies pale, suggestive of cachexia; nourishment poor; a palpable tumour on the right side of the abdomen was found extending from just above the umbilicus to the region of the cæcum, movable, and which was sometimes lost under the rectus muscle. It appeared to be situated in the descending colon. First x-ray report stated fibrosis of lung, hypotonic stomach, dropped cæcum and enteroptosis, and later x-ray report (barium enema), large gut from rectum to hepatic flexure fills normally. There is a filling defect in the ascending colon which is probably due to spasm, but might be due to organic disease. Laboratory report: negative; amœbic cysts, ova and T.B.; Wassermann negative.

Operation.—Abdomen was opened by a right paramedian incision. A tumour was found involving the cæcum and ascending colon. It was found impossible to bring the mass through the above incision, so the rectus was sutured to its sheath and divided transversely. The cæcum with the appendix, ascending colon, hepatic flexure and about four inches of ileum was resected, and the distal end of ileum and proximal end of transverse colon were closed by a purse string and Lembert's sutures, and a side to side anastomosis was effected between these two portions of gut. The abdominal wound was closed in layers. Laboratory report: "a typical adeno carcinoma." Although his convalescence was delayed considerably by a *Bacillus coli* infection of abdominal parietes, he is now, at the time of writing, October 31, 1927, in normal health, putting on weight, appetite good, bowels acting regularly, no indication of recurrence, and he is about to be discharged to sick leave and a period of light duty.

THE DIAGNOSTIC VALUE OF THE LEUCOCYTE COUNT IN ACUTE ABDOMINAL CONDITIONS

By Surgeon Commander J. A. MAXWELL, M.B., F.R.C.S.

Preamble.—The diagnosis in some abdominal cases is plain sailing, in many it is abominably difficult, and in these, when for any reason a facile diagnosis by laparotomy is undesirable, any additional data are worth having.

The value of leucocytosis in diagnosis is a matter of dispute: the figures given below are interesting, and show that leucocytosis bears a ratio to the intensity of the intra-abdominal lesion sufficiently constant to make the count well worth while in cases clinically doubtful. These counts were taken by men who do thirty or more every week; where such practised competence is not available, the personal error plus physiological fluctuation invalidate the readings.

In this paper the cases under review number 113. In all the leucocyte count was taken on admission and in the vast majority operation was performed within twenty-four hours.

They have been divided arbitrarily into five groups:—

(1) *Mild or Catarrhal Appendicitis*.—This heading includes cases normal or nearly so, and chronic lesions.

(2) *Acute Appendicitis*.—Cases in which inflammation, though severe, was limited to the appendix and in which no gross gangrene had occurred.

(3) [illegible] *Appen*[illegible]—In which some p[illegible] organ was fou[illegible] ations at [illegible] and including [illegible]

(4) *P*[illegible] *Gastric* [illegible] *Ulcer*

(5) [illegible] (nat [illegible] posed)

Th[illegible] table [illegible] leucocytosis [illegible]

[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]

[illegible] ration of the cases it would appear [illegible] [illegible] relation to the grav ty of the abdominal [illegible] the following [illegible] may be drawn

(1) [illegible] of 10,000 [illegible] specially if repeated is strongly against [illegible] pro[illegible]

(2) [illegible] 10,000 [illegible] 000 is of very doubtful significance

(3) [illegible] 000 [illegible] in argument in favour of operation in abdominal cases [illegible] a very high count and leucocytosis is not of much value [illegible] from an abdominal lesion

(4) [illegible] count of 18,000 or over is almost invariable in perforated gastric or duodenal ulcer [illegible] tosis is of great diagnostic value in the dangerous and [illegible] [illegible] clinical symptoms are anomalous or absent following [illegible]

(5) [illegible] count weighs more heavily against an acute condition [illegible] If time permits repeated counts indicating [illegible] increasing or diminishing are of more value than any [illegible]

(6) [illegible] can overrule clinical evidence

FOUR CLINICAL CASES

By Surgeon Commander HORACE HILL, M.R.C.S., R.N.

(1) Post Encephalitis Lethargica

F. H. B. was admitted to R. N. Hospital, Chatham, with the following history: He had been behaving in a strange manner for a month but not enough to bring him into serious trouble until the last few days, when he conducted himself in such a manner as to lead one to suspect mental instability. He was emotional and wept on the least provocation. One afternoon he went ashore at Weymouth and made himself a general nuisance in a shop, eventually purloining a mouse-trap which he did not pay for. The next day he tied all his clothes up in a big parcel and tried to post them. He talked a great deal and was sly in his manner. While being prepared for hospital in the sick bay he appropriated a cap ribbon from another boy "as if the action were perfectly in order." He was stated to be noisy and sings lewd songs.

On admission he was examined for signs of post encephalitis. Diplopia was present; he had great difficulty in focussing an object near his eyes, and the power of convergence was almost lost. The diagnosis was made and later he developed two more signs, namely, salivation and a monotonous tone of voice.

Physically he was as active as a monkey. His [illegible] emotion, and was always full of expression. He was kept unl[illegible] for a week or two, special care being taken to note his hours of sl[illegible] these cases are apt to become very wakeful at night and rampage [illegible]. He slept well every night, was quiet and well behaved while under [illegible] and gave no trouble. He was finally invalided and sent home with the [illegible] that the boy might behave in an odd manner at times.

The sequel is interesting. A short time after his arrival home his parents wrote and said that his behaviour was alarming, and the letter went on to say: "A few of the many things he has done since Saturday might perhaps explain my reasons for writing to you: (1) He has refused to go to bed and has had no sleep since he arrived home. (2) He orders us to bed. At 3 a.m. on Sunday morning he opened tins of fruit, &c., and brought them upstairs. (3) He has upset a table of crockery and flung a kettle of water all over the place and made the house upside down with the contents of drawers all over the place. (4) Whilst I was out at the doctor's this morning he returned home, took his father's motor cycle from the garage and is at present in hospital after being detained by the police regarding the cycle."

Cases which exhibit eye signs only, without the typical Parkinsonian attitude and expression, are often very active and the change in character is more marked. They are often quiet when under control, but as soon as this is relaxed there is no certainty as to what they will do. A definite history of an attack of actual encephalitis lethargica is often absent. There is often a history of some pyrexial attack, which had been labelled "influenza," but influenza never causes diplopia.

(2) Myocarditis

This case is an illustration of the difficulty of discovering the presence of myocarditis by clinical signs alone. If the history of any past illness was denied, a recruiting medical officer, on clinical grounds alone, would have no reason for rejecting a recruit if his condition happened to be the same as when this case left the hospital on October 30, 1927 (see below). A survey board might hesitate to invalid a boy so apparently well by clinical signs. The electro-cardiogram in most cases would reveal the myocardial lesion.

On admission to hospital very little the matter could be detected in this case, but he had a history of tonsillitis and a pyrexial attack. He continued to thrive, and on discharge: (1) His heart was normal in size by clinical examination and x-rays; (2) the sounds were normal; (3) there were no murmurs; (4) the pulse was normal; (5) the response to effort was good. He had only been at duty two days when a recurrence took place. He became ill, his heart enlarged, the pulse was rapid and a systolic murmur was heard at the apex. Under treatment the heart symptoms abated but the important sign of a rapid pulse remained. Response to effort was poor. At the subsequent survey the notes were: "Suffers from dyspnoea, tachycardia and giddiness on exertion. Heart slightly enlarged, systolic murmur at apex after exertion. Pulse rate lying down 88, sitting up 116, after exertion 128, two minutes later 108." This type of pulse rate is a valuable indication of the presence of myocardial mischief after rheumatism even if no other signs can be elicited without the electro-cardiogram.

This point is well illustrated by another case. F. T. P. admitted on December 28, 1927, with a history of an attack of rheumatic fever on December 12, 1927. He had enlarged tonsils, myocarditis and a soft systolic murmur at the apex. These signs diminished under treatment and on January 17, 1928, x-rays showed no cardiac enlargement. But the pulse was rapid all the time, this being the sign that the myocardial mischief was still active. The response to effort was bad. On January 18, 1928, he had a recurrent attack of rheumatic fever.

(3) S[illegible]ACUTE I[illegible] ENDOCARDITIS

T[illegible] was admitted on March [illegible] suffering from pneumonia He had [illegible]ous attack on Septemb[illegible] 1926 His acute symptoms passed off [illegible] developed a long continued [illegible] which was not due to empyema. Th[illegible] of pyrexia of obscure [illegible] were investigated Amongst other test[illegible] cultures, parasites tubercle bacilli Widal reaction Wassermann tes[illegible] and Mediterranean fever &c all gave negative results. [illegible] was often present Pain occurred in the region of the liver on [illegible] An exploratory operation was done There was no liver abscess and nothing [illegible] was found No cause for this pyrexia could be found until [illegible] (1) His complexion became *café au lait* in colour (2) [illegible] in his left leg (3) an embolus lodged in the pad of his right [illegible] petechiæ occurred on the neck and shoulder and left flank These [illegible] occurred from time to time The heart sounds varied, and the organ was shown to be enlarged by *x* rays This supported the diagnosis The usual treatment for such a condition was carried out In the final stages the patient had a failing heart with œdema and ascites, which had to be tapped To combat the œdema and ascites he was given novasurol This had an unexpectedly vigorous effect in eliminating the œdema, which involved his legs and also lessened the fluid in his abdomen After the novasurol it was not necessary to tap the abdomen again before the patient died, nor did the œdema return

(4) AMYOTROPHIC LATERAL SCLEROSIS

H S admitted on October 18, 1927, invalided on December 7, 1927 This disease began with cramps in the muscles of the shoulder girdle and arms followed by a similar condition in the legs (1) The muscles of the scapular region, deltoid and those in front of the chest and upper arms were affected by the tonic atrophic form of paralysis, and showed a vivid display of fibrillation (2) The lower limbs were a little spastic, and the peroneal muscles were beginning to get weak (3) Bulbar paralysis was present The muscles of the tongue were much wasted and showed lively and constant fibrillation This organ was rounded soft and lessened, speech was affected words being pronounced with difficulty Dysphagia was commencing and was rapidly increasing Saliva was beginning to collect in the mouth The orbicularis oris was affected whistling and pursing of the lips being impossible The muscles attached to the hyoid bone were weak and fibrillating (4) Tendon jerks were all abnormally brisk (5) Sensation and sphincters normal

Reviews.

MODERN METHODS IN THE DIAGNOSIS AND TREATMENT OF RENAL DISEASE By Hugh Maclean, M D D Sc F R C P Professor of Medicine, University of London Director of the Medical Clinic St Thomas's Hospital Honorary Consulting Physician to the Ministry of Pensions Consulting Chemical Pathologist to St Thomas's Hospital London Constable and Co Ltd 1927 Third edition revised and enlarged with four coloured plates Pp 136 + viii Four illustrations Price 12s net

The appearance of the third edition of this very popular monograph is sufficient testimony of the success which it has already achieved The present edition is practically the same as its predecessor, with the exception of the chapter on treatment which has been entirely rewritten so as to include a detailed

[illegible] description of the various methods [illegible] treatment of acute and chronic renal disease. Emphasis is laid throughout the book on the importance of the various tests for investigating renal function which are now accepted as of the most practical value.

The classification of chronic nephritis into two types, viz., azotæmic and hydræmic, is based on certain findings by chemical tests. It is considered preferable from the clinical standpoint to deal with these chronic conditions solely from the point of view of renal function. In Chapter VII is given a most useful and practical scheme for the examination of renal patients, which in the author's opinion furnishes all the information necessary in the great majority of cases of nephritis. A more elaborate scheme for examination is also outlined for use when the necessary laboratory facilities are available. Special attention is drawn to the importance of ascertaining the state of the kidneys in certain genito-urinary conditions, e.g. enlarged prostate, before any extensive surgical procedure is undertaken. The chapter on treatment is an outstanding feature of the new edition and will be found of the greatest assistance. The regulation of diet, particularly as regards protein intake, both in acute and chronic renal disease receives special consideration. During the early stages of the acute disease a low diet with little protein is generally indicated. In cases of the hydræmic type the best results will be obtained by the use of a liberal protein diet, provided there is no nitrogenous retention, the aim being to give as much protein as can be conveniently tolerated. On the other hand in dealing with cases of the azotæmic type of moderate severity, whilst some restriction of protein is called for, the general mistake of giving too low a protein diet should be avoided when this is not at all necessary. The use of urea for its diuretic action is discussed and the type of case indicated in which its administration is likely to prove beneficial.

This book is already well known to students and practitioners and it is needless to say that the present edition maintains the high standard of its predecessors.

The Diagnosis of Pancreatic Disease. By Robert Coope, M.D., B.Sc., M.R.C.P., Senior Assistant Physician, Royal Southern Hospital, Liverpool; Assistant Physician, Hospital for Consumption and Diseases of the Chest, Liverpool; Lecturer in Clinical Chemistry, University of Liverpool. London: Humphrey Milford, Oxford University Press. 1927. Pp. viii + 112. With twelve figures. Price 6s. net.

This excellent little volume, which is in substance the subject of the Rogers Prize Essay in the University of London, 1926, deals in a very clear and concise manner with the diagnostic problems of pancreatic disease. In order to appreciate the difficulties surrounding this subject it is necessary to realize, as pointed out in the introductory remarks, that extensive damage may be done to the pancreas with little or no external and clinical evidence. The various lines of investigation are considered in detail and the numerous laboratory tests discussed, attention being drawn to those which the author has found most useful. The clinical value of examination of the fæces with reference to the effect of exclusion of pancreatic juice from the intestine on the digestion of food is considered with reference to (1) azotorrhœa, (2) creatorrhœa, (3) steatorrhœa, and (4) the lecithin content of fæces. In this connection it is noted that in the author's experience the presence of "true creatorrhœa" on a controlled diet, provided that the time of passage through the gut is within normal limits, is almost absolutely diagnostic of failure of the pancreatic juice to reach the intestine. The view is held that this test gives as much and indeed more information, if it is properly controlled, than the more complicated and time-consuming researches on nitrogen percentage or total nitrogen loss. Further, it is not considered that an investi-

[illegible] oral fat [illegible] with [illegible] to the diagnosis of a pancreatic [illegible] the trouble [illegible] The [illegible] relationship of the pancreas with [illegible] glands is [illegible] to and the [illegible] mydriasis test of Loewi [illegible] fact that [illegible] may be positive in disease of the gall bladder [illegible] of pancreatic disease detracts [illegible] for diagnostic purposes This book can be strongly [illegible] references given at the end will [illegible] useful to those [illegible] to pursue the subject further

R W G S

[illegible] Medicine By W Langdon Brown M A M D [illegible] F R C P [illegible] St Bartholomew's Hospital Modern Medical Monographs [illegible] by Hugh Maclean M D D Sc F R C P Professor [illegible] Medicine [illegible] University of London London Constable and Co Ltd 1[illegible] Price 7s 6d net

[illegible] account of the endocrine system and its diseases in [illegible] prove of great service to the general practitioner [illegible] author's own personal experience in the laboratory [illegible] valuable addition to the popular series of modern [illegible] As [illegible] in the preface there are several encyclopaedic [illegible] too large a scale for the busy practitioner to [illegible] author has been to link the physiological and clinical [illegible] chapter he gives a brief account of the biological [illegible] system in relation to the visceral nervous system The [illegible] next considered a useful classification being [illegible] endocrine balance met with Attention is drawn [illegible] and to the frequency with which tonsillar [illegible] condition in childhood Concerning the [illegible] to note that conditions of pituitary deficiency in [illegible] such commoner than of overaction Some of the distinctive features [illegible] which condition it is pointed out that a facial [illegible] so characteristic are the eyes Successive chapters [illegible] in a very clear and lucid manner with the thyroid parathyroids, pituitary adrenals &c With regard to the thyroid we learn that study of the endocrines started with this gland and our knowledge of the pathology and treatment of its diseases has always remained in advance of that of the rest of the endocrine system It is perhaps not generally recognized that slighter forms of hypothyroidism are quite common Many manifestations of this condition are attributable to rheumatism although really due to myxoedematous infiltration of ligaments and fasciae Chapter IX contains a summary of the effects of the endocrine system on general metabolism Repeated estimations of the basal metabolic rate give the most accurate guide to the progress in cases of Graves disease and help to decide whether medical means have reached the limit of their capacity to help Under endocrine therapy the various methods of administration of the extracts are referred to and the indications for their employment briefly discussed It is considered that the accuracy of our observations on endocrine therapy would be improved if biochemical tests could be devised to demonstrate the effects of an extract and the author looks forward to the introduction of such tests on the lines of those employed for investigating hepatic efficiency

This book contains in a very readable form a most excellent summary of the present state of our knowledge regarding the endocrine system and can be strongly recommended to the attention of all who are interested in the subject

MODERN METHODS IN THE DIAGNOSIS AND TREATMENT OF GLYCOSURIA AND DIABETES. By Hugh Maclean, M.D., D.Sc., F.R.C.P., Professor of Medicine, University of London, and Director of the Medical Clinic, St Thomas's Hospital; Honorary Consulting Physician to the Ministry of Pensions; Consulting Chemical Pathologist to St Thomas's Hospital. London: Constable and Co., Ltd. 1937. Fourth edition revised with thirteen charts and two figures. Pp. 312 + xi. Price 12s. net.

The fourth edition of this well known monograph contains some additional material particularly relating to the use of insulin in diabetes. Provided no other complications are present there is no doubt that insulin when properly used can prove of the greatest benefit to all who suffer from this disease. When administered according to the directions given by the author it is quite safe and never produces any unpleasant symptoms. It would appear that insulin in the treatment of diabetes is not so extensively employed by medical practitioners as might be desired. This monograph aims at giving to the busy general practitioner a short and concise account of our present knowledge of diabetes and glycosuria from the clinical point of view. Emphasis is laid on the necessity of fully investigating all cases of doubtful glycosuria in order to ascertain the true nature of the process. For the sake of the patient it should never be forgotten that glycosuria does not constitute diabetes. Blood sugar estimations carried out in connection with the ingestion of some carbohydrates provide more information in glycosuria and diabetic cases than any other method. The estimation of blood sugar is now a simple process and can be successfully undertaken by any medical man with the minimum of chemical equipment. Further, when carried out by the author's method only a very small amount of blood is required. The indications for the use of insulin in cases of glycosuria in elderly patients are not always clear. As is well known many of these cases appear in robust health and make no complaints. When, however, such symptoms as severe pains in the limbs, eye changes, &c., are a prominent feature, the question of insulin treatment must be considered. In such cases improvement may not always be so marked as in younger patients, owing to the presence of degenerative changes along with the glycosuria. Contra-indications to the use of insulin are angina pectoris and cardiac degeneration. If insulin is used in such cases the urine should not be rendered sugar free nor should any attempt be made to keep the blood sugar within normal limits. The great point is to keep the blood sugar moderately high so as to prevent hypoglycæmic attacks. Chapter X gives a very useful summary of the minimum number of tests considered necessary in bad cases of diabetes followed by a detailed description of the management of a case of coma. We have great pleasure in recommending this book to all naval medical officers.

MALARIA IN INDIA. By Major General Sir Patrick Hehir, K.C.I.E., C.B., C.M.G., M.D., F.R.C.P.E., F.R.C.S.E., D.P.H.(Camb.), D.T.M. (Liverpool University), I.M.S. (Retd). Oxford Medical Publications. London: Humphrey Milford, Oxford University Press. 1937. Pp. xx + 490. 109 figures and 15 colour plates. Price £2 2s. net.

This volume has grown out of the author's "Prophylaxis of Malaria in India" (1910) which revised, enlarged, illustrated and brought up to date is incorporated with it. It is a work of exceptional merit and deals in a most exhaustive manner with all the more important aspects of the subject of malaria in India. Particular attention has been devoted to the practical side of prevention in communities and in the individual. The contents are arranged into three main parts with numerous subdivisions. Part I, which embraces endemiology, epidemiology and ætiology, deals with the prevalence, mortality, geographical

distribution [illegible] of malaria in [illegible] and then [illegible] remarks to this [illegible] one of the most [illegible] economic [illegible] is admitted that although the difficulties [illegible] disease are formidable, still it is [illegible] unhappily [illegible] is not at the [illegible] specially prepared [illegible] this book [illegible] included to this [illegible] It is the first [illegible] although for various reasons [illegible] complete [illegible] degrees of prevalence of [illegible] India [illegible] With reference to the [illegible] malaria [illegible] of effective treatment of malaria cases during the [illegible] order to lessen the prevalence of malaria [illegible] knowledge [illegible] classification, structure, habits and life history of mosquitoes is [illegible] indispensable to all medical men and [illegible] practising in India and [illegible] and malaria officers [illegible] is the most important [illegible] malaria in India with a sporozoite rate of from [illegible] to [illegible] per cent [illegible] with a sporozoite rate often reaching to 6 per cent or higher The [illegible] of the malaria carrying mosquitoes of India [illegible] complete and [illegible] illustrated by excellent coloured plates which call for special notice [illegible] of malaria the [illegible] method is not considered an infallible guide and the author draws attention to the fact that it is not sufficiently widely known how uncertain diagnosis by this method may be

The clinical and pathological effects of malaria in India are discussed in Part II, which includes a description of the malarial fevers in India and their treatment, clinical and chemical pathology and pathological anatomy of malaria As regards pernicious attacks a point of great practical importance is that when multiple infection of red cells exceeds 5 per cent of the infected cells, or over 200,000 parasites per c mm urgent and immediate treatment by quinine intravenously is indicated

Among the more important points considered in the diagnosis of malaria fevers may be noted the therapeutic quinine test and the use in special cases of provocative agents such as injections of sterile milk cold splenic douches and subcutaneous injection of adrenalin (1 mgr), &c The last-named gives the largest proportion of positive results

The methods of prevention of malaria in India are described in Part III from every aspect, including segregation of the healthy isolation of the infected sterilisation of malaria, antimalarial legislation, use of quinine mosquito control &c. Every aspect of the problem of quinine in malaria in India is associated with serious difficulties About 80 to 100 million cases of malaria occur annually and at the present time the total world output of quinine is insufficient to meet this demand It is advocated that the price of quinine and cinchona febrifuge should be kept within reasonable bounds by the Government owning the cinchona plantations manufacturing the drugs, and regulating their sale and distribution in this country

Finally, economic and sociological problems connected with malaria in India are referred to The author strongly holds the view that the prevention of malaria is most intimately connected with, probably inseparable from, improvement in the economic conditions of the rural population

We can thoroughly recommend this volume, not only as a textbook but as a work of reference The numerous illustrations are exceedingly well reproduced

R W G S

[illegible] and [illegible] Bale Sons and [illegible]

[illegible] either or [illegible]

[illegible] closed and open method [illegible] the [illegible] familiar with the closed method [illegible] rubber bag with a [illegible] no few accidents to [illegible] the [illegible] anaesthetic. The open [illegible] appeal to the profession [illegible] the [illegible] at their disposal [illegible] the nose and [illegible] with eight layers [illegible] sprayed [illegible] and a towel or lint placed [illegible] spitted on [illegible] on and [illegible] a change in the [illegible] takes the [illegible] of a quick [illegible] The [illegible] differing from the pallor [illegible] the closed [illegible] and eventually the corneal [illegible] disappears [illegible] tory and the present writer [illegible] from sixty to ninety seconds [illegible] sary. Ethyl chloride [illegible] anaesthesia. This latter [illegible] ethyl chloride is [illegible] that [illegible] liary to ether or chloroform [illegible] himself agreeing with those [illegible] and consequently [illegible] chloride can be used as [illegible] are to be preferred for this purpose. W. [illegible]

RESEARCHES IN POLYNESIA AND MELANESIA [illegible] IN SAMOA TONGA [illegible] 1925. Parts I and IV [illegible] Patrick A. Buxton, M.R.C.S., D.T.M. [illegible] M.A., F.L.S. Published by the [illegible] Medicine, London. July 19[illegible]

This volume, the first of the [illegible] and Tropical Medicine [illegible] little known subject of medical [illegible] years in Polynesia and [illegible] work on medical entomology [illegible] surgeons. The book is [illegible] complete and detailed account of [illegible] islands with many good [illegible] heat the authors devised [illegible] which gave satisfactory [illegible] will appeal to the expert meteo[illegible] is devoted to field observation [illegible] mental work on [illegible] native and introduced is given [illegible] In this part the severely techni[illegible]

amusing remarks on certain of the insects described For example, in referring to the fact that human fleas were probably absent from the Pacific Islands until introduced in 1820 to Rarotonga by *Goodenough* who discovered it the authors remark that the placid natives of Aitutaki observing that the little creatures were constantly restless and inquisitive and even at times irritating drew the reasonable inference that they were the souls of diseased white men Another recent introduction *Cimex rotundatus* is known in the New Hebrides as *One big fella flea a stink* and as *Louse belong white man*

As an example of the energy expended by the authors we may instance the following Thinking that certain fish would be of practical use as destroyers of mosquito larvæ they took several hundred top minnows (*Poecilia sphenops*) from Panama to Samoa a distance of 8,000 miles, in 4 gallon petrol tins, feeding them on scraped liver and minced lettuce and changing their water twice daily

Part IV contains a minute record of experiments performed in order to elucidate the various factors which control egg laying in *Aedes* and those which cause the eggs to hatch The tropisms of *Aedes* to an enormous number of different influences are studied even to the effect of the exact hydrogen ion concentration (pH) of the water or infusion preferred for egg laying It is impossible in a short review to give an adequate idea of the immense amount of painstaking experimental work done by the authors on this subject and it is perhaps a little disappointing to read in the summary that the large amount of research on *Aedes* and its environment "has on the whole added to the pre existing confusion" A great deal of the results appear to the ordinary reader to be recondite, and the experimental conclusions, as the authors remark will not appeal to the so called "practical man" In short, it is a scientific work written by scientists for scientists, and we must congratulate Dr Buxton and Mr Hopkins on their production of so important and valuable a book

The book is well bound and printed, and plentifully supplied with charts and diagrams twelve excellent plates showing typical breeding places of mosquitoes are provided at the end of the book F G H

PLASTIC SURGERY OF THE HEAD FACE AND NECK By H Lyons Hunt M D L R C S Edin, Licentiate of the Royal College of Physicians Edinburgh, and of the Faculty of Physicians and Surgeons of Glasgow Late Captain, U S Army Consulting Plastic Surgeon Midtown Hospital New York City Consulting Plastic Surgeon Lexington Hospital, New York City, Member British Medical Association, Fellow American Medical Association, &c Illustrated with 342 engravings and 10 coloured plates Lea and Febiger Philadelphia and New York 1926

This volume is an epitome of the history and development of plastic surgery of the head face and neck Each chapter is of interest to the general surgeon the teaching is modern and sound the contents being set forth in a clear and easily comprehensible manner The author offers a skilful plea for cosmetic work it is not always vanity which prompts the patient to seek advice; in the race for employment a youthful and attractive appearance often wins when age and ugliness fail Reading the book, one is struck by the enormous amount of ground work to be covered before reasonable skill can be acquired The preliminary essentials are all to be found in the earlier chapters which deal fully with the basic principles of the technique with the structure and physiology of the tissues concerned, and with the psychology of the patient Asepsis, haemostasis by torsion (*ligatures are never used*) a knowledge of *Langer's* lines and of the important "considerations of time"—all these must be acquired

The author condemns paraffin injections as indefensible on any ground The operation for excision of paraffinomata though a simple procedure, is frequently

[illegible] by delayed healing [illegible] recom[illegible] to infiltrate [illegible] against the use of concentrated sol[illegible] described.
The details of method in the chapter [illegible] excellent.
There is much to be learnt in the [illegible] and traumatic conditions of the [illegible] the author's method is excision, substitution [illegible] and finally Roentgen rays; recurrence [illegible] palate and hare lip will be of interest to all [illegible] congenital and traumatic defect; it epitomises [illegible] since 1919 and [illegible] the richer by the addition of the author's original ideas and methods. The illustrations, diagrammatic and photographic, are superb; none of them could be spared. Some of the worst war cases are depicted. The photographs show in every instance, results which are almost incredible. The diagrams emphasize the care and skill expended in the conduct of [illegible] metrical calculations upon which a perfect result depends.

The book is well produced and most emphatically worthy of study.

R J G P

Physical Signs in Clinical Surgery. By Hamilton Bailey, F R C S Eng, Surgeon, Dudley Road Hospital, Birmingham; late Honorary Assistant Surgeon, Surgical Registrar, and Tutor, Liverpool Royal Infirmary; Surgical Registrar and First Surgical Assistant, London Hospital, &c. First edition. Bristol: John Wright and Sons Ltd. 1927. Pp 217 with 261 illustrations. Price 21s net.

Essentially a practical book throughout, and one which ought to appeal to all students undergoing their practical training in the wards and to those reading for higher qualifications. The author is to be congratulated on producing a book which deals so lucidly with the practical side of diagnosis in surgical procedures, and he brings into prominence many valuable signs and tests which are omitted from the ordinary textbooks on surgery. The volume is well arranged, and easily read and the illustrations are well produced.

T W M

Mosquito Surveys. By Malcolm E Macgregor, Entomologist, Wellcome Field Laboratories. Baillière, Tindall and Cox. 1927. Pp 282 with 3 Maps and 59 Illustrations. Price 15s.

This little book is the result of the author's experience in Mauritius and it is believed will be of use to others studying the problem of the prevention of malaria in other parts of the world, but, of course, it does not deal with all the various local difficulties which may be met with.

The foreword, by Sir Ronald Ross, contains much sound advice, and this is followed by chapters dealing with the anatomical and systematic characters of the anophyline. These are succeeded by much information re the laboratory and field study of the insects. Some of the most useful is that treating on the staff required for mosquito work; this must consist of both European and Native trained labour. He emphasizes the importance of a thorough knowledge of what are the local malarial carriers and their habits; also that it is better to do a small area thoroughly than a large one incompletely, the latter being often worse than useless and very uneconomical.

The book is well printed and contains a large number of plates and figures which will be of great assistance to those taking up this line of preventive medicine.

[illegible]

[illegible] Navy [illegible] recollections [illegible] gather [illegible] The [illegible] relate [illegible] West the Naval [illegible] high places [illegible] to make the [illegible] a whole [illegible] they [illegible] often better [illegible] who has seen the [illegible] of progress [illegible] He has [illegible] at the [illegible] have gone by how the [illegible] the latter [illegible] Gunnery School [illegible] Mr. [illegible] War [illegible] the naval medical [illegible] such [illegible] [illegible] that [illegible]

[illegible] the Admiral of the Russian Baltic Fleet [illegible] the duties of all sea [illegible] of the past [illegible] how he kept his trust. On the medical [illegible] these to present days the author is [illegible] methods of unnecessary uprooting at [illegible] great interest to the medical officer [illegible] that he [illegible] that era. His [illegible] the respective [illegible] Dartmouth [illegible] the Public School [illegible] Where all have been taught alike brought up [illegible] with the same teaching and manner of thought there can [illegible] potential power to the full development. His [illegible] startling in a man so [illegible] in his profession and [illegible] transparent a character [illegible] on the other [illegible] Public School [illegible] have impressed the author [illegible] individuality.

He considers the naval medical [illegible] sufficiently attractive to [illegible] doctors to enter it and [illegible] he closes his book with the words "*Certainly if I had my [illegible] I should [illegible]*" Space does not allow of the telling [illegible] stories [illegible] Naval [illegible] and the soul stirring [illegible] of the [illegible] campaign.

We strongly recommend this book [illegible] one of those delights not [illegible] aside until [illegible] a happy vein [illegible] not only to all [illegible] the Service but to all real book lovers [illegible] worthy of a place [illegible]

[illegible]

Preparations, &c.

WELLCOME CONCENTRATED TETANUS ANTITOXIN [illegible]
(2,000 International Units per cubic [illegible])

Burroughs Wellcome & Co. are now supplying [illegible] Globulins containing 2,000 units per c.cm. [illegible] elimination of proteins of no antitoxic value [illegible] reduction in volume is secured and the administration [illegible] doses [illegible] "Tabloid" Wellcome Concentrated Tetanus Antitoxin Globulins [illegible] prepared at the Wellcome Physiological Research Laboratories [illegible] Burroughs Wellcome & Co. in phials containing [illegible] 10 c.c.

Notice.

CONFERENCE ON RHEUMATIC DISEASES

A conference on rheumatic diseases is to be held in Bath [illegible] Friday May 10 and 11 1928. Sir George Newman, C.B., Medical Officer of the Ministry of Health, has kindly consented to act as President of the Conference. There will be three sessions: (1) Social aspect, presided over by [illegible] of Pain; (2) Causation, presided over by Sir Humphry Rolleston, Regius Professor of Physic, Cambridge; and (3) Treatment, presided over by Sir [illegible] Farquhar Buzzard, Regius Professor of Medicine, Oxford. [illegible] Hon. Medical Secretary is Dr. Vincent Coates, 10, Circus, Bath.

PUBLICATIONS RECEIVED

We beg to acknowledge the receipt of the following: British Medical Journal, Indian Medical Journal, Tropical Medicine and Hygiene, Tropical Diseases Bulletin, Public Health Reports U.S.A., Health News U.S.A., Middlesex Hospital Journal, Annals de Medicina Naval e Colonial, Guy's Hospital Gazette, Medical Review, Health (Australia), Westminster Hospital Gazette, Journal of State Medicine, University of Durham College of Medicine Gazette, L.O. [illegible] Magazine, Revue Internationale de la Croix Rouge, Charing Cross Hospital Gazette. We apologize if there are any omissions.

News of the Service.

OBITUARY

We have to record with great regret the death of Surgeon Rear Admiral Sir Percy Bassett-Smith, K.C.B., which occurred at his residence at Blackheath on December 29, 1927.

Born in 1861, the son of the late William Bassett-Smith, he was educated [illegible] and at the Middlesex Hospital, taking the L.S.A. in 1882 and the M.R.C.S. Eng. and L.R.C.P. Lond. diplomas in 1883. In 1913 he [illegible] M.R.C.P. and was elected F.R.C.P. in 1918. He took the D.T.M. & H. at Cambridge, and in 1916 was elected F.R.C.S. Eng.

Entering the Royal Naval Medical Service as Surgeon in August 1884 he was promoted to Staff Surgeon in 1896 and specially promoted to Fleet Surgeon in 1903 for his outstanding professional ability and research work. In June 1919 Bassett-Smith was promoted to Surgeon [illegible] and placed on the retired list in [illegible] with the rank of Surgeon Rear Admiral, being re-employed as a retired officer until March 1921.

He was created C.B. in June 1911, was Honorary Physician to H.M. King George, and was awarded the C.M.G. in 1916 and the K.C.B. in June 1921 after his retirement.

All through his career [illegible] Smith was an [illegible] work. From [illegible] days when he [illegible] occupied [illegible] zoology and his pockets [illegible] frogs and oth[illegible] [illegible] leisure [illegible] [illegible]

[illegible] Smith had [illegible] his prac[illegible] [illegible] valuable [illegible]

[illegible] the R.N. Medical Service [illegible] the [illegible] Museum [illegible] 1911 [illegible] his favourite [illegible] reports [illegible] natural history [illegible] received [illegible] trustees of the British Museum.

In 19[illegible] he was specially [illegible] to Fleet Surgeon [illegible] Blane Medal [illegible] He was also Craggs research prizeman [illegible] Tropical Medicine. From 1909-12 he was lecturer on tropical [illegible] Haslar and from 191[illegible] to 1914 professor of clinical pathology at Greenwich [illegible] the Admiralty in appreciation [illegible]

He was the author of articles on snake bite and poisonous [illegible] Medicine [illegible] 1916 and [illegible] Practice of Medicine [illegible] various papers [illegible] Fleet Surgeon [illegible] JOURNAL OF THE ROYAL N[illegible] which he was a great [illegible] and able contributor.

[illegible] Smith was always [illegible] member of [illegible] 1921 [illegible] until [illegible] the following [illegible] his death. In 1922 he was [illegible] appointed [illegible] a regular attendant at all those meetings [illegible] and long [illegible] was appreciated [illegible]

After his retirement [illegible] on the staff of the [illegible] Hospital and St. [illegible] Southsea [illegible] always in a hurry [illegible] always courteous and cheerful.

At the funeral [illegible] on Wednesday morning, January [illegible], at St. Margaret's Church, Lee, the Council of the British Medical Association was represented by Major-General Sir Alfred Bleakmsop, the Naval and Military Committee by Dr. F. W. [illegible] the Headquarters Staff of the Association by Dr. C. [illegible] Assistant Medical Secretary. On the same day a short service was held at St. Luke's Church, R.N. Hospital, Haslar, by the Chaplain, the Rev. C. P. C. [illegible] M.A., R.N. The service was attended by Surgeon Rear-Admiral D. W. Hewitt, C.B., C.M.G., F.R.C.S., M.B., and the staff of the Hospital as well as by many officers of the port.

With Haslar Bass[illegible] Smith was intimately connected for thirteen years and he lived at No. 7 The Terrace. [illegible] there [illegible] church his children were baptized and on the day he was laid to rest [illegible] old pupils and former shipmates met in the same edifice in grateful recognition and honour of a famous officer of the R.N. Medical Service.

He married Constance Brighton, daughter of the Rev. [illegible] Hastings, who died in 1925. He leaves two daughters, to whom we all extend our deepest sympathy.

We regret to announce the death of Surgeon Captain John [illegible] Phillips, R.N. (retired), which occurred on [illegible] Born July 10, 1870, he qualified in [illegible] taking the degrees of M.R.C.S. and L.R.C.P. 189[illegible] Entering the R.N. Medical Service May 18, 1895, he was promoted to Staff Surgeon 1901 and Fleet Surgeon 1909, and was placed on the retired list July 1922 with the rank of Surgeon Captain. Commencing his career as Surgeon of the *[illegible] George*, Channel Fleet, he served more or less continuously in H.M. ships at home and

[illegible] and kindly disposition [illegible] made Phillips a [illegible]
[illegible]
[illegible] deepest sympathy.

[illegible] of Surgeon Commander [illegible] Murphy, R.N. (retired), [illegible] 22, 1928. Qualifying [illegible] and Glasgow with [illegible] L.R.F.P.S., 1897. He entered the R.N. Medical Service [illegible] 1898 and was promoted to Staff Surgeon 190[illegible] [illegible] Commander 1914. [illegible] 1918 Murphy [illegible] temporary commission [illegible] of April 1, 1918 [illegible] to ill health [illegible] medically unfit [illegible] the rank of [illegible] Colonel [illegible] appointments [illegible] R.N. Hospital [illegible] under particular [illegible] Murphy [illegible] equal and his [illegible] shall be forgotten by [illegible] who knew him.

To his family we extend our deepest sympathy.

We regret to announce the death of Surgeon Lieutenant-Commander [illegible] Joseph Carroll, R.N., which occurred at the R.N. Hospital, Hong Kong, [illegible] 1928. Born July 21, 1891, he qualified in the Royal [illegible] Ireland [illegible] M.B., B.Ch., B.A.O., 1916. Entering the R.N. Medical Service as a Temporary Surgeon [illegible] the same year, he was transferred to the permanent list [illegible] November 1918 with seniority of October 1916, and was promoted to Surgeon Lieutenant-Commander [illegible] 1923. After serving in the *Glowworm* [illegible] during the Great War, he was appointed to R.N. Hospital, Haslar, from December 1919 to March 1921, and was then appointed to [illegible]. Two years later he served in the *[illegible]* and then [illegible] Dockyard. After completing his period of [illegible] he was appointed to Hong Kong Dockyard.

Carroll [illegible] by all those who [illegible] a [illegible] and a keen and zealous supporter of [illegible]

To his family we extend our deepest sympathy.

We regret to announce the death of Surgeon [illegible] Commander Charles [illegible] Bell, R.N., which occurred on December [illegible]. Born February [illegible] he graduated in the Royal University of Ireland with the degrees [illegible] M.B., B.S. [illegible] November 1902. During the early part of the Great War he served in the [illegible] and in December 1915 was appointed [illegible] No. 2 [illegible] Station. From June 1917 he [illegible] November 1918.

To his family we extend our deepest sympathy.

DISTINCTION

The Fellowship of the [illegible] College [illegible] London has been [illegible] Surgeon Vice-Admiral H. [illegible], C.B., O.B.E., F.R.C.S., D.P.H., Medical Director-General of the Royal Navy.

HONOURS

The King has been graciously pleased to approve of the award of the R.N.V.R. Officers' Decoration to the undermentioned Officers: [illegible] January [illegible] 1928:

Surgeon Commanders T. [illegible] and A. E. W. [illegible], R.N.V.R.

DEGREES

Surgeon Commander S. [illegible], M.B., D.P.H., R.N., [illegible] the Membership of the Royal College of Physicians (London) (M.R.C.P.) [illegible] January [illegible] 1928, as a result of passing the examination on January [illegible] 1928.

ANNOUNCEMENT

Royal Naval Medical Club—Annual [illegible]

The Annual [illegible] of the Royal Navy Medical Club will be held [illegible] April 26 1938 at the [illegible] Restaurant (Empire Rooms) Piccadilly C[illegible]

All particulars [illegible] be obtained from the Hon Secretary S[illegible] A T Rivers R N Queen Anne's [illegible] Chambers [illegible] Street London S W 1

PROMOTIONS

Surgeon [illegible] Commander H [illegible] Stephens M B [illegible] Dec [illegible]

Surgeon [illegible] S Ketchell [illegible] to be Surgeon Lieutenant [illegible] 1938

Surgeon [illegible] F [illegible] M B to be Surgeon Lieutenant [illegible] March 1938

Surgeon Lieutenant [illegible] J [illegible] Lem[illegible] and [illegible] Barker to be Surgeon [illegible] (D) March [illegible]

APPOINTMENTS

December (1937)

Surgeon Captain J H [illegible] to *Malta*

Surgeon C[illegible] D Tr[illegible] M B D O M S to R N H [illegible] [illegible] C A S Hamilton to [illegible] H [illegible] H M W[illegible]

Surgeon [illegible] B S Collinge to [illegible]

Surgeon [illegible] Sh[illegible]field [illegible] and L P Spero to [illegible] R D S[illegible] D D[illegible] M B to [illegible]

January (1938)

Surgeon [illegible] S[illegible] M B [illegible] S M O [illegible] M B to *Iron Duke* T W J [illegible] W [illegible] M B to [illegible] F M O [illegible] A G Taylor M B to *Cyclops* [illegible]

Surgeon Commander R A N W [illegible] Roberts to [illegible] and A Scott Mackenzie to H M A S [illegible]

Surgeon [illegible] to Portsmouth Yard

Surgeon [illegible] to *Iron Duke* J H Nicholson to [illegible] J [illegible] Holmes to *Hood* [illegible] A F Phillips to [illegible] T McN[illegible] [illegible] W H[illegible]y to [illegible] H Harkness *Drill* J W S[illegible]son to *Valiant* [illegible] to *Valorous* [illegible] H B[illegible] M B J A K Fitzgerald M B J W Nesbitt M B [illegible] D Sh[illegible] M B [illegible] R [illegible] Williams M B and A [illegible] Kingston entered as Surgeon Lieutenants R N for Short Service

Surgeon Lieutenant (D) D L Samp[illegible]on to *Resolution*

February

Surgeon Captain W W Ke[illegible] C M [illegible] M D R N H Hong Kong

Surgeon Commanders [illegible] (and as [illegible] and M T O) A G Mal[illegible] to *Courageous* [illegible] to H M [illegible] (as Liaison M O) H M [illegible]twaite M D to Malta Hospital (and as Surgical Specialist) W J Morris M B to [illegible] W F Bagshaw M B to [illegible] M B [illegible] R [illegible] M B to *Pembroke* [illegible] to [illegible] W H Munro to *Pembroke* and as S M O

Surgeon Lieutenant Commander W [illegible] Colledge to R N H [illegible] (and [illegible] list)

Surgeon Lieutenants [illegible] to Devonport R [illegible] to Deal Infirmary P J M[illegible] M B to *Vindictive* C H Nichols to [illegible] G S Rutherford to *Ceres* W R S [illegible] to *Hector* [illegible] W Wilson M B D [illegible] to [illegible] R W Higgins M B to [illegible] M B to *Centurion* [illegible] A S [illegible] H H Fisher to [illegible] [illegible] Dartmouth [illegible] R [illegible] C H J Hall [illegible] S L Lord and W D M[illegible] M B entered as Surgeon Lieutenants R N for Short Service

[illegible]

[illegible]

RETIREMENTS

Surgeon Captain [illegible] M.B., F.R.C.S. Edin., placed [illegible] January [illegible]

Surgeon Commander [illegible] O.B.E., placed on retired list [illegible] with rank of Surgeon Captain, January 3, 1928.

Surgeon Commander [illegible] Adey, placed on retired list [illegible] rank of Surgeon Captain, January 1, 1928.

Surgeon Commander [illegible] M.B., D.P.H., placed on [illegible] regulation [illegible] Captain, February 9, 1928.

Surgeon Lieutenant [illegible] resigned, December 28, 1927.

QUEEN ALEXANDRA'S ROYAL NAVAL NURSING SERVICE

Entries

Miss D. M. Chapman, entered as Nursing Sister, December 29, 1927.
Miss F. D. Bishop, entered as Nursing Sister, January 2, 1928.
Miss K. W. F. O'Callaghan, entered as Nursing Sister, January 2, 1928.
Miss F. M. Wilkinson, entered as Nursing Sister, January 2, 1928.

Appointments

Nursing Sisters Miss D. M. Chapman to R.N.H., Chatham, December, 1927; Miss [illegible] Bishop to R.N.H., Plymouth, January, 1928; Miss K. W. F. O'Callaghan to R.N.H. [illegible] January, 1928; Miss F. M. Wilkinson to R.N.H., Chatham, January, 1928; Miss [illegible] Dartmouth Sick Quarters, February, 1928; Miss K. Baker to R.N.H., Malta [illegible] Miss E. L. Roy to R.N.H., Chatham (after Foreign Service Leave); Miss M. [illegible] R.N.H., Malta, February, 1928; Miss A. M. F. Northcott to R.N.H., Plymouth (after Foreign Service Leave); Miss [illegible] to R.N.H., Hong Kong, February, 1928; Miss J. Curwen to R.N.H., Chatham (after Foreign Service Leave); Miss L. [illegible] to Shotley Sick Quarters, February, 1928; Miss H. M. Bryant to R.N.H., Chatham, February, 1928; Miss A. Ralph to R.N.H., Chatham; Miss E. J. M[illegible] to R.N.H., Plymouth, February, 1928.

Assistant Massage Sister Miss K. L. Vernon to R.N.H., Malta, February [illegible]; Assistant Massage Sister Miss M. V. Andrews to R.N.H., Chatham (after Foreign Service Leave).

Resignations, &c.

Nursing Sister Miss M. Fuller resigned appointment, October [illegible], 1927.
Nursing Sister Miss D. Lampard resigned appointment, October [illegible], 1927.
Nursing Sister Miss F. M. Bamford placed on retired list on account of age regulations, October 20, 1927.
Nursing Sister Miss C. A. Rhodes resigned appointment, October [illegible], 1927.
Nursing Sister Miss A. Haverick resigned appointment, November [illegible], 1927.
Nursing Sister Miss B. A. de Haguiere placed on Retired List, November 25, [illegible]
Nursing Sister Miss M. L. McNab invalided, December 5, 1927.
Nursing Sister Miss H. Lamond resigned appointment, January, 1928.

Notices

The [illegible] Medical Officers to send in Original Papers on professional subjects, [illegible] personal experiences, &c. Items of news and matters of interest to the Naval Medical Service will be welcomed from ships and establishments on home and foreign stations.

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Original Articles.

DISCIPLINE AND MENTALITY.

By Surgeon Commander HORACE HILL, M.B., B.S., M.R.C.P.

A WELL disciplined man is a disciple, which being interpreted means a willing follower. The state of being willing is a mental one and it is important to produce and foster it. The mentality of discipline is divided into two, that of those who administer it and that of those who are subjected to it. The mental attitude of those subject to discipline can also be divided into two, that which understands its purpose and is willing, and that which is not. Under the latter come those who look upon discipline as a relic of barbarism, and as something unpleasant which can be applied to them as a punishment or for the purpose of giving them a shake up. Others regard it as something which undermines their manhood, or which interferes with their rights. The Navy naturally includes some of these people. They fail to grasp the principle that discipline and regulations are the means by which the majority are enabled to enjoy any freedom or liberty at all. In fact, wise discipline engenders far greater liberty, and also safety, for the majority. For instance, there is nothing derogatory or humiliating in the regulation that in driving along a road everyone shall keep to the left. It is to the advantage of everyone to obey this, for it enables the majority to proceed on their way in an orderly fashion, and to arrive at their destination with reasonable certainty, in the minimum amount of time, and with the maximum of safety. The same principles apply to the rule that an engine driver must not proceed past a signal which is against him. These two simple illustrations often help a man, especially when new to the Service, to grasp the reason for discipline. They see at once that there is nothing derogatory or humiliating in these rules, and that without them roads and railways would be in a state of chaos and impassable. It impresses on them that discipline is also an

[illegible] willing [illegible]. This is an example of what can be attained by [illegible] willing obedience which has been trained. That is discipline. It is an extremely necessary mental state to obtain for the purpose of discipline. How is it called into existence? By a knowledge and under

[illegible] the Service are contributed [illegible] Service [illegible] [illegible] [illegible] persons feels [illegible] an essential part of [illegible] safe keeping of the [illegible] of the past and the [illegible] present ... [illegible] entirely in his own hands. By [illegible] and by the presence of [illegible]. By a respect [illegible] for their leadership as possible. By Service [illegible] which distinguish the Service from other [illegible]. By [illegible] good drill and cleanliness of body and ship [illegible] competitions (interdivisional, inter-divisional and inter-ship) [illegible] the team spirit and teach each man to identify himself with the ship [illegible] goal of the Service is each individual's goal, the pride of the Service [illegible] and the wish of the Service his wish. [illegible] the wishes and the purpose of the man coincide with [illegible] Service [illegible] higher is the esprit de corps and the greater the degree [illegible] the less one hears of discipline. One [illegible] ball team, yet it is there in its highest form [illegible] heard of. The personal aim and wish of each player [illegible] of the whole team. The team plays as a whole [illegible] stands that the success of the whole team depends [illegible] fails. Each player takes pride [illegible] history and traditions to uphold and a reputation to keep [illegible] ment of the team will be felt as a personal [illegible] stake. Tradition is a great incentive. It [illegible] or on what soil it was reared but what does [illegible] for and all the honors and glory which surround it.

For the proper production of esprit de corps [illegible] rivalry or something for this force to [illegible] against [illegible] must be continuous. These principles [illegible] Captain R. Oldham's apt illustration of children shelling [illegible] remember is as follows. If five children are [illegible] common bowl they will tire in a few minutes [illegible] else. If a spirit of rivalry is introduced [illegible] they will be more interested and do better [illegible] than before. When the interest flags get [illegible] children in each and give each family [illegible] compete against family. The shelling of peas [illegible] family develops a routine which suits it best [illegible] identifies himself as part of that family and feels that [illegible] and appreciated. Now try changing one child [illegible] another. Routine is spoilt, resentment springs up [illegible] The new child feels out of place [illegible] group cause and feels nothing more or less than [illegible] shell peas. As the children grow in number [illegible] compete against those of Sussex. The men in the sub-divisions and [illegible]

and in ship should be treated on the same principles starting with the subdivision. And it follows that men and officers in a ship should not be changed oftener than possible, and the men of one subdivision should not be interchanged with those of another or sent to other units for duty. It can now be seen that esprit de corps, upon which only true discipline can be founded, is a natural instinct and is to be fostered on natural lines. Esprit de corps gives truth and good intent, and with this spirit prevailing one hears nothing of threats and punishments. Discipline which can only be carried out by means of punishment is artificial discipline. If esprit de corps and good intent are present the only discipline necessary is to convert the willing obedience into a trained obedience. It therefore follows that true discipline can only be applied after the mental state of willing obedience has been attained, and is only applied to train the obedience. Therefore no cause for punishment ever arises.

Moral is the general spirit or state of mind of a force, and can be compared to the character of an individual. The principles which produce and influence the character of an individual will act in the same way on the moral of a force. Moral is based on self respect. But the moral of a force is by no means measured by the average of each individual's character, for when individuals are collected into groups a subtle change occurs: the group mind appears. This can be played on almost to any extent. Medical men are well aware of this. A group can be incited to fearful panic or frightful violence, whereas the same incitement applied to each individual separately would have little or no effect. Emotion can suddenly be born in the group mind and spread rapidly, and ordinary common sense is frequently absent. A mob will do anything. But this group mind can be educated and controlled. For instance fire drill done daily in a school prevents a mob panic if fire does break out. Moral directs esprit de corps on the right road. In the Navy the group mind is common. It exists in ships, barracks, divisions and subdivisions, &c. Moral is a tendency to act up to high standards, and if the standard is not high there is little moral. Tone is different, it is a tendency to act either way and can be influenced by high or low standards. Tone is mood, it varies. If the moral is high, such things as depression, boredom, ennui which are likely to affect tone have little or no effect. At the worst they are only temporary. Moral is the result of the education of the group spirit, for without it a force becomes a mob. Esprit de corps may be there but it is ill directed without moral. We have seen that moral produces motives for acting up to high standards. Esprit de corps produces the willingness to act thus. Discipline is the governing hand which controls them and makes the very best use of them. Leadership is the means by which these things are produced, fostered and made to bear fruit. Physical fitness has a potent influence in maintaining a high standard of these virtues. It may be mentioned in passing, that however skilful in arts and crafts a ship's company may become, owing to the ever increasing use of machinery, technical skill can never take the

[illegible] which produces the mental qualities [illegible] [illegible] [illegible] hine.

Leadership is the power to inspire. Men will be inspired by an officer whose personality is attractive, whose nature is that of a gentleman who knows his men and looks after their interests and comfort and who also knows his job thoroughly, as he also thereby inspires confidence. A good leader will know how to foster the qualities necessary for true discipline. He gets the right mental attitude in the group spirit.

The group spirit or group mind as it is sometimes called is too big a subject to be dealt with here, but one illustration may be taken. Consider a body of men who have been housed together for a long time in barracks or buildings surrounded by tradition and with the same cause at heart. Separate off a twentieth of these men and officers and remove them to a different habitation more squalid and unpleasant in character. Immediately a rift occurs between the two bodies. Those who have been removed feel slighted, their pride of service diminishes, they become less willing, morale suffers and discontent arises. Moreover they do not like their friends to see the difference made between them and their companions. The best of recruits and those with any self-pride, would take care not to join the isolated party. This effect on the mental state of the group mind causes deterioration. True or willing discipline will go and punishments begin. This is the simplest example of an effect on a group mind, for it will be seen that each individual is affected. Far more complicated is the study of cases in which the group mind is affected greatly and the individual very little.

Individuality.—To the average man when joining the Service is huge and his mental capacity is not capable of grasping its purpose and its working. He does not feel sufficiently connected with the Service to make the good of the Service a motive in his daily work and rather than being identified with the Service he tends to lose his identity in a crowd. To overcome this a man should be taught that it is his work which adds to the fabric on which all the smartness and reputation of the Navy depend, and that he is not a casual labourer hired to clean the decks. He should also be taught the purpose of the Service its composition, organization, traditions and customs. If men understand the composition of the Service it makes them realize that the different branches in the Navy are interdependent on one another. If men know the traditions of the Service which exemplify courage, loyalty, heroism and endeavour, the fact that these deeds were performed by men of their own profession stimulates their pride and admiration for it and also a desire to live up to the past.

The extreme value of a word of praise for a man's work and its mental effect can now be understood. He feels that his work is appreciated and is of some use in the great cause. He feels identified with the work and so with the Service as a whole. His feeling is akin to that of a man who has shot a goal in an important match. He is no longer a non-entity. Pride and self-respect are instilled, he feels encouraged and more willing

[illegible] often [illegible] extraordinarily [illegible] serve [illegible] work [illegible]

[illegible] esprit [illegible] the [illegible] years of [illegible] absent [illegible] These people [illegible] increase the [illegible] mental condition [illegible] the Navy can well [illegible]

[illegible] namely the [illegible] it is difficult for a [illegible] For instance, some of us in the Navy join [illegible] five or six years of [illegible] we have been accustomed to come [illegible] are hard and our characters formed [illegible] which discipline is [illegible] this reason some of [illegible] discipline well known to those [illegible] In the first place if an act [illegible] dealing with it. It should [illegible] full deserts. At the same [illegible] ought to be ascertained, for it will often [illegible] or is unaware of his [illegible] to junior officers and [illegible] with people in civilian life [illegible] of the uniform to exhibit [illegible] true discipline so [illegible] manner. Bad temper [illegible] to be avoided. Such things [illegible] it will be a long time before the men put him back into [illegible] in the Service that a bad tempered reprimand may not have the good effect of a quiet word of advice, which recalls a man to his sense of duty. There are two things which the new officer finds difficult to contend with. With the best intentions in the world mistakes will occur and a junior officer may feel that he has been unjustly or unfairly dealt with. The danger occurs when the officer accused

[illegible] and [illegible] [illegible] that [illegible] no alter[illegible] [illegible] The senior officer will [illegible] cannot be expected that [illegible] will understand that a mistake [illegible] is still the same cheerful will [illegible] that [illegible] with one's salt [illegible] only make matters worse [illegible] An order should be quite clear [illegible] defined orders, with words in [illegible] which neither side can [illegible] become disorder and counter [illegible] unpleasant is not "good for discipline" [illegible]

Lastly, there is something [illegible] men and officers were asked to [illegible] divergent answers. Initiative [illegible] common sense and some are not [illegible] to sum up a situation correctly [illegible] matter and act on it. An other [illegible] this in any emergency and [illegible] afraid to act. Initiative does [illegible] taken to increase notoriety [illegible] responsibility. Neither does it [illegible] which endeavour is made to [illegible] officer may attempt to explain away [illegible] book by saying that he writes this [illegible] with a memory as bad as that probably [illegible] part. It will be seen that the [illegible] willingness. The highest form of [illegible] obedience and not that which compels [illegible] man is eager, contented, healthy [illegible] of honourable traditions and feels that [illegible] in these he will be willing [illegible] state and then the discipline which [illegible] automatically appears. The only [illegible] that of training.

[illegible] WARFARE [illegible] OFFICER OF [illegible]

[illegible] Commandant [illegible]

[illegible] the title [illegible] Warfare and the [illegible] Health [illegible] as to how future [illegible] civil population [illegible] that no one will [illegible] battle fronts [illegible] dealt with. I shall [illegible] even [illegible] I would be like [illegible] that has [illegible] the first place [illegible] population [illegible] on the [illegible] applied [illegible] great value [illegible]

[illegible] war is only an [illegible] expect from [illegible] path. The [illegible] began to strive [illegible] means of [illegible] in order that we [illegible] Chemical [illegible] important [illegible] which [illegible] the savage [illegible] It is [illegible] fighting [illegible] The [illegible] of the [illegible] little as [illegible] that [illegible] general, [illegible] throughout the world by the [illegible] of the [illegible] of

[illegible] Read [illegible] published [illegible]

King Canute in commanding the tide not to [illegible]. It is the opinion [illegible] number of prominent military leaders of all nations that aero-chemical weapons, i.e. aeroplanes and war gases will be the dominating factors [illegible] future wars. Quite recently the Air Minister when introducing the estimates painted a grim picture of the next war [illegible] quote from the morning papers. Year by year we see the instruments of air [illegible] continually perfected; we realize the great possibilities of development [illegible] range of bombs of chemicals and liquid gas, and we [illegible] less than the most pacifist citizens—are appalled by the prospect of the future.

If we examine the history of siege warfare we shall soon discover that the causes of surrender in order of importance have been treachery [illegible] starvation and assault. Here we obtain three different means of accomplishing a siege—the attack on the *mind* of the defenders (for which in its military meaning is demoralization), the attack on the resources of the defenders and the attack on the defences of the defenders. All acts of war ultimately aim at creating a state of treachery in [illegible]; in other words, their object is to reduce the enemy's mind to such a point that he is willing to set aside his national existence or policy and accept the [illegible] of his adversary. To attack the will of an enemy [illegible] population by a rapid means would appear to be [illegible] as to attack it by slow means such as [illegible] sinking his ships and starving his women and children. [illegible] town, what human elements within it [illegible] receptive to treachery or demoralization? [illegible] The reason for this is self apparent: soldiers [illegible] civilians by fear. Consequently the main targets of the [illegible] the civilian inhabitants of the country attacked, for if these [illegible] corrupted however well disciplined their soldiers and [illegible] organization will become affected and their *morale* [illegible].

In future wars the fighting forces will enjoy a high degree of protection against war gases, and for this reason an enemy might not [illegible] waste his chemical agents against protected and highly trained troops [illegible] employ them against the less protected and less disciplined [illegible]. It would appear possible that in future wars the fighting forces will [illegible] bear the direct brunt of war but would be [illegible] arsenals, dockyards, munition works, manufacturing [illegible] the seat of the government have been drenched with [illegible].

I have already pointed out that the object [illegible] the enemy's people and as aircraft possess [illegible] and navies is it not to be expected that [illegible] rather than those forces? Whatever the civilian may [illegible] in the next war it will be brought home to him [illegible]. In a famous cartoon of the last war a French soldier [illegible] in a half obliterated trench says to his comrade [illegible] *[illegible] — If only the civilians hold out.* [illegible]

[illegible] the field of battle will probably cover a [illegible] fighting country. The marked difference [illegible] population will vanish as every [illegible] under continual danger of attack [illegible] it will be possible to pursue a com[illegible] will be practically no limits to the [illegible] the flying capacity of aeroplanes [illegible] enlightened us on another innovation in [illegible] the automatic manless aeroplane [illegible] out of sight from the ground [illegible]. It is difficult to imagine [illegible] may, however, assert even now that [illegible] that should a war break out [illegible] of the last one. There is [illegible] London would constitute a [illegible] to make such an attack [illegible] of attacks by enemy [illegible] on a large scale would [illegible] *followed by chaos*. The [illegible] will have something to say [illegible] most important is this: that [illegible] by bombing a civilian [illegible] Woolwich it would [illegible]

[illegible] to the use of scientific weapons such as gas [illegible] yet they will use such humane weapons as [illegible] bombs. During the last war mustard [illegible] put out of action, shells killed one for [illegible] gas is thirteen times as humane as bullets [illegible] *par excellence* the weapon of demoralization [illegible] necessarily killing, it more than any other [illegible] the policy of one nation on another. [illegible] of this method of warfare must [illegible]

[illegible] part of my theme and approach some [illegible] chemical warfare. Such problems [illegible] specific chemical substances used. For [illegible] may be divided into two classes [illegible] (*b*) those which are non-persistent. [illegible] depends upon the physical condition [illegible] the vapour pressure. Gases in general [illegible] are apt to be persistent, but solids that have become [illegible] as smokes behave like gases and are relatively non-persistent. [illegible] reasons non-persistent gases such as chlorine and phosgene would [illegible] no great value as aero chemical weapons

for use on industrial centres, arsenals [illegible] popul[illegible] account of the high concentration necess[illegible] during which the substances would [illegible] substances in the concentrations attained [illegible] than the persistent substances but [illegible] they quickly become inert by their disper[illegible] different are the persistent agents among [illegible] only liquid reigns supreme. Mustard gas is the [illegible] toxic substances. It may not be as lethal as the [illegible] but it produces many more casualties on account [illegible] not unlike those found in contagious diseases. [illegible] occur from the vapour of this highly persistent substance [illegible] and effectiveness of which depend on meteorological [illegible] temperature, which latter also controls its vapour pres[illegible] its highly vesicant properties. Hence the [illegible] casualties themselves but carry the oily liquid on the [illegible] of their boots, and infect buildings and spaces occupied [illegible] remote from the site of contamination; in other words [illegible] resembles any other specific contagious disease, and must [illegible] on the same lines. For example, casualties from [illegible] immediately apparent; the skin burns may take any time up [illegible] four hours to appear, and therefore observation will have [illegible] over those directly exposed to the contamination.

Again, in contaminated areas it would be necessary to [illegible] between the contaminated and the non-contaminated [illegible] every kind would be disorganized, so the evidence [illegible] into as in the case of a contagious disease. Decision [illegible] to what clothing and buildings &c. must be regarded as [illegible] cleansed or destroyed if grossly contaminated. As [illegible] persistent contaminated articles will remain infective [illegible] time. Mustard gas has not a very striking odour, and [illegible] tration the sense of smell becomes quickly fatigued [illegible] may be present in sufficient quantities to produce injury with[illegible] perceived by the olfactory sense. Another important question to [illegible] in mind is the possible contamination of food and water supply which will require attention. So it will be gathered from what I have said that mustard gas is very like a contagious disease, and when used in large quantities over wide areas the medical officers will have to act very much as they would in the presence of an epidemic. As to the actual organization to meet such problems I shall leave this entirely alone, as it is better that it should emanate from the proper authorities to avoid confusion and possibly the dissemination of widely divergent views. I wish, however, to emphasize the necessity of providing an adequate organization in peace time which should be capable of expansion to meet war requirements. It is a common thing these days to read newspaper articles telling how this

[illegible] It [illegible] we [illegible] Education is [illegible] The people must be taught the rudi[illegible] scientific weapons such as [illegible] of [illegible] due to fear of the [illegible] in the future, there is no [illegible] officers of health to play a big [illegible] ng the civil population [illegible] Their resources, [illegible] to stamp out outbreaks [illegible] taxed still [illegible] called upon to fight the [illegible]

[illegible] Sir Oliver Lodge believes that man [illegible] with the advance in [illegible] and incidentally chemical [illegible] an outcrop of science.

[illegible] that this paper imperfect and [illegible] interest in a subject which is likely to [illegible] the reticence and restraint which [illegible] in dealing with this subject, and the [illegible] I would that you should eke out my [illegible]

THE [illegible] OF CARBON DIOXIDE.[1]

[illegible] S. GOODWIN, M.D., M.A., D.P.H.

[illegible] the unpleasant effects which result from [illegible] the atmosphere of a badly ventilated room arose from the [illegible] by the animal bodies present in the room. Experiments [illegible] the laboratory demonstrated that these effects are probably not [illegible] cause. This theory may be considered to be in abeyance and [illegible] poisons has been permanently discarded. At a later time, when it [illegible] possible to estimate the amounts of gases present in an atmos[illegible] accuracy, those unpleasant effects were thought to be [illegible] the rebreathing of the products of respiration, importance [illegible] to the accumulating amount of carbon dioxide gas. But [illegible] laboratory experiments have proved that this conception was [illegible]ble.

In recent years the theory generally held is that the effects are due to

[1] [illegible] read at the Royal Institute of Public Health Congress, Ghent, June 192[illegible]. [illegible] by kind permission of the *Journal of State Medicine.*)

heat retention Opinion [illegible] has [illegible] accepted this view and maintains that the two other causes [illegible] It has naturally followed at the present day when problems of ventilation are being discussed, that more attention is paid to the physical condition of an atmosphere than to its chemical constituents In elementary human physiology although it is not actually taught that carbon dioxide is of little use to the animal body it has somewhat injudiciously been named a waste product of metabolism An opinion has arisen in consequence that in hygienic problems consideration of the presence of carbon dioxide gas is of little moment, and that this body plays an unimportant part in the general economy of animal life This is incorrect, and it may not be amiss to review briefly the rôle that carbon dioxide plays in normal life and what its effect may be when it is present in abnormal amounts

Respiration is a phenomenon of which we are not usually conscious We know that it can be modified by nervous influences, but it is rarely borne in mind that the whole process of respiration is due to the presence of carbon dioxide in the blood and without the presence of carbon dioxide respiration must cease. It is known that in the medulla there is a specialized portion of grey matter which deals solely with the respiratory function, sending out rhythmical impulses to the muscles of respiration This special centre is extremely sensitive to the amount of carbon dioxide in the circulating blood

Normally the arterial blood contains carbon dioxide of a tension of about 42 mm of mercury and this tension is kept remarkably constant During the passage through the body carbon dioxide derived from the many processes of tissue and muscular metabolism is taken up and the venous blood when it arrives at the lung epithelium contains carbon dioxide of a tension of some 45 mm Diffusion through the alveolar wall reduces this amount to the 42 mm tension of the arterial blood Under certain circumstances that may be voluntary or involuntary this amount of carbon dioxide can be reduced By forced breathing a condition of apnœa is produced This is simply due to the carbon dioxide falling below its normal level in the blood thus failing to excite the respiratory centre and therefore breathing for a time ceases

Under other circumstances the amount of carbon dioxide in the blood may be increased Such an increase is a great stimulant to the centre and leads to an output of impulses to the respiratory muscles of a different degree with the result that breathing is greatly increased in depth More air is inspired and more carbon dioxide expired until the tension of the carbon dioxide in the circulating blood is reduced to its normal amount Such is an outline of the manner in which respiration is controlled in the body and control in this aspect has been termed the chemical control of respiration

It must not be forgotten however that there is a certain nervous control which is largely affected by psychological or mechanical stimuli that arise

[illegible] volume [illegible] it is possible [illegible] in the blood but [illegible] that [illegible] alteration of the [illegible] without the scope of this paper [illegible] although carbon dioxide may be [illegible] product of metabolism it has an [illegible] the body in the expired air.

[illegible] that the presence of carbon [illegible] important factor in preserving that [illegible] themselves. Any increase or [illegible] its tonic condition. This [illegible] system of the blood-vessels [illegible] in the carbon dioxide [illegible] independent of nervous [illegible] is brought about.

[illegible] dioxide [illegible] the normal amount in [illegible] has been shown to be the [illegible] of applying venous con- [illegible] for the purpose of causing more rapid healing [illegible] quoted [illegible]. The relative immunity [illegible] of the [illegible] of the heart is attributable [illegible] in the venous blood giving it [illegible] power is thought to be due [illegible] the proteins with the formation [illegible] the tension of the carbon dioxide [illegible] evidence available to show that [illegible] below the normal. From the hygienic [illegible] interest of carbon dioxide lies in the study of the [illegible] is inspired in a proportion higher than that which [illegible]

As is well [illegible] percentage of carbon dioxide is 0·04 in normal air. This [illegible] remarkably constant both out of doors and in well-ventilated [illegible] dwellings. In tunnels and in badly-ventilated [illegible] and other places where people congregate [illegible] there is usually a higher percentage. It was mentioned previously that when there is an increase of carbon dioxide in the blood [illegible] immediately responds through the respiratory centre by increasing [illegible] respiration in an attempt to keep the tension at a normal level. This affords a clue to the train of symptoms which occur when the carbon dioxide in the inspired air is increased or is increasing progressively. With slight increase, say to 1 per cent., the amount of air inspired and expired [illegible] increased from about 500 c.c. per minute to approximately 800 c.c.; at 2 per cent. it is increased to about a litre and a half, and at [illegible] per cent. it is somewhere about two litres. There is a tendency for the

respiratory volume to increase [illegible] than the percentage of carbon dioxide in the inspired air. With [illegible] slightest rise of the carbon dioxide in the inspired air the body begins to respond immediately, but for a time these responses are unnoticed. When the carbon dioxide has approached a percentage of 1.5 to 2 occasional yawning is experienced with a feeling of restlessness. When 2 per cent of carbon dioxide is reached, a feeling of oppression on the chest is noticed and the increase of respiratory volume becomes apparent. At 3 per cent this feeling of oppression becomes like that of a heavy weight, and small exertion is accompanied by an almost asthmatical shortness of breath. Once experienced these symptoms are extremely impressive. It is quite possible to undergo this abnormal respiratory experience for some hours while instruments recording the physical condition of the same atmosphere [illegible] which would indicate a condition of absolute comfort.

A person entering a room containing such an atmosphere of 3 per cent of carbon dioxide acquires this oppressive feeling within a minute and his respiratory volume is almost immediately increased [illegible]. It is under circumstances such as these that the fallacy of basing [illegible] and deductions on theories of heat retention are at once evident. It is well known that deductions have been made pointing to the [illegible] better, the non-deleterious action of carbon dioxide on the human subject by experiments made by shutting up one or more persons in a sealed chamber for varying lengths of time and adding definite proportions of pure carbon dioxide gas from cylinders situated outside the [illegible]. For physiological purposes such deductions may be of value, but for the purpose of hygienic problems these deductions should be [illegible] caution, since it appears that the circumstances of such experiments are not comparable with the conditions produced by a number of persons confined in a badly ventilated hall or room where the products of respiration are allowed to accumulate naturally. From these [illegible] experiments mentioned above, the deductions lead to the [illegible]. It is often stated that the symptoms produced by breathing an atmosphere containing 3 per cent of carbon dioxide are exactly the same as those produced after running a mile. In the latter, especially in the untrained subject, there is a considerable increase in the rate as well as the depth of breathing. To produce a similar increase in the rate of breathing requires an atmosphere of 10 per cent, but in such a case the volume of the breathing would be greatly increased.

While this aspect is being considered reference may be made to the attitude often adopted by many of deducing what should be the percentage of carbon dioxide after a certain time by the simple calculation of the amount of gas expired by each individual. The [illegible] again obtained from the result of chamber experiments. Personal experience leads one to regret that the fact is that the calculated percentage is rarely in agreement with the actual figures obtained in what may be termed

[illegible] not far to seek [illegible] clothing, various teeth [illegible] ginates in the intestinal [illegible]. Not all of the carbon [illegible] lungs. In ruminants [illegible] side of expiration is [illegible] similar production of [illegible] the no information [illegible]

[illegible] youth led one to [illegible] the oxygen of the air [illegible]. In later years with [illegible] this but it is still [illegible] externally. Painted [illegible] and all animal [illegible] d temperatures [illegible] th a c ... tion of carbon [illegible] has been shown that under [illegible] 20 to 40 per cent of carbon [illegible] moulds are present this [illegible]. Thirdly in actual [illegible] tically sealed chamber but [illegible] hill. These are factors [illegible] dioxide apart from that [illegible] ... ble functions.

[illegible] systems of the body. The [illegible] the heart. A subject with a normal pulse [illegible] athing an atmosphere containing 8 per cent of [illegible]. When carbon dioxide is increasing in amount [illegible] stolic and diastolic blood pressures rise, and rise [illegible] systolic pressure of 108 mm rose to 134 mm [illegible] an atmosphere containing 8 per cent carbon [illegible] the venous blood pressure under the same con[illegible] of water to 105 mm. It is worthy of note that [illegible] atmosphere although the arterial pressures [illegible] the venous pressure required ten minutes [illegible] to attain their previous rates.

[illegible] percentage carbon dioxide becomes per[illegible] percentage it becomes a definite poison [illegible] containing 8 per cent of carbon dioxide [illegible] and nausea and an appreciable rise of [illegible]. If the concentration reaches 10 per cent [illegible] difficult breathing, giddiness and loss of [illegible]. At higher percentage dangerous symptoms would appear, and [illegible] breathed an atmosphere containing 30 per cent of carbon

[illegible] [illegible] loss of sensibility [illegible] the heart.

In the alimentary canal carbon dioxide stimulates the mucosa and promotes absorption. It is also absorbed itself by the intestine. It also has a stimulating action on the skin, and it is used in the solid state as a caustic for skin complaints. In therapeutics its value as a powerful stimulant of the respiratory centre is proved by its application in the treatment of carbon monoxide poisoning. It will, therefore be seen that carbon dioxide has a very definite influence upon the human body, so much so that in suitable quantities it can act either as a stimulant or as a poison. If present in an atmosphere of more than a normal amount it has a slight although often unnoticeable, influence. As the proportion increases the influence becomes more definite passing from an insidious stage of discomfort to a stage of definitely dangerous symptoms.

It would appear that although the conclusions deduced from physiological experiments carried out in the laboratory indicate that carbon dioxide has no effect on the human subject in ordinary conditions of life, too great a reliance should not be placed on these findings. I personally incline to the greater importance in hygienic matters to the chemical condition of an atmosphere than to its physical condition. I am aware that this view is not widely accepted at the present time, and while I do not wish to revive earlier discussion I feel that there may be more recent experience and opinions which would be of great value and my object in writing this paper is to evoke these views on such an important subject. I am much indebted to the sources mentioned below for the completion of these remarks.

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NOTES FROM A TRAINING ESTABLISHMENT (H.M.S. *ST. VINCENT*)

[illegible] H. W. NICHOLLS [illegible]

[illegible] it is not my intention however [illegible] [illegible] medical officers of the training service [illegible] hope that my experience may be of passing interest to those [illegible] establishment from its reception. It has been my privilege [illegible] myself) to watch not only the evolution of the boy seaman, [illegible] development of the place wherein they have their life and being. [illegible] in coming into commission on June 1, 1927, created no [illegible] carried on the same service in fresh surroundings. For we [illegible] boy seaman's training establishment to be situated in those [illegible] fronting the main road of the considerable borough of Gosport, [illegible] separated by a brief stretch of water from Portsmouth.

The establishment occupies the Forton Barracks, for many decades the [illegible] quarters of the Royal Marine Light Infantry. It has been said with [illegible] that people wept when this famous regiment marched out in 1922 [illegible] the last time. Nor do I think this was due to loss of material trade [illegible] but to the fact that the marines had become part of the very heart of [illegible]. In my previous service with them I know that there were few [illegible] in the town which did not house marines, and the marines of the [illegible] generation. So it was without surprise but with pleasure that we [illegible] the inhabitants give a warm welcome on June 1 to the 434 boys from [illegible] who arrived to commission the *St. Vincent*. Despite a journey [illegible] started at 6 a.m. and a long delay due to the Derby traffic they [illegible] into the barracks at 4.30 p.m., the essence of smartness appropri[illegible] headed by our marine band. They were briefly inspected by the Mayor of Gosport, the guest of the commanding officer, and then dismissed [illegible]. It was noticed that though leg weary the smaller boys were determined to convince us that they had arrived from a very distinguished training establishment—their expansion of chest was remarkable. These boys were in all stages of training so as to get things going as quickly as possible, and lest we should be slow recruits began to arrive on June 6.

We share with Rome the distinction of not being completed in a day, and I think it probable that money was more fluid then than in the present year of grace. If everything did not happen as quickly as we wished, yet we had all the thrills of seeing something fresh arrive almost every day till at length we achieved such substantial pieces of furniture as a covered swimming bath, and so gradually the place has evolved and, if not yet the

last word in establishments, threatens to become a rival to the best in the not too distant future

SICK BAY

The establishment being run entirely on ship lines, the sick bay is unique in being situated outside the barracks For it is the old Royal Marine Infirmary with the addition of two new wards and a dental surgery, with its front in the main road, and therefore much in the public eye with the Red Cross flag flying In fact, one of the earliest discoveries we made was that passengers on the tops of trams had a more than generous view of the casualty and dressing rooms Whilst of course we are only a sick bay with twenty-six beds, there is no doubt that locally we are thought of as a hospital and referred to as such, and so on quite a few occasions civilian cases, some quite serious, have been brought in to us for first aid or disposal Accidents have a way of happening in the vicinity of the sick bay but it has always been considered a pleasure to give help on these occasions, for the residents of Gosport take an abiding interest in the doings of our ship I should state that before coming here I was sent for a week to Shotley to learn all that was possible in that time The greatest kindness was shown me by Surgeon Captain Denny and all the officers, but it was only practicable to carry away the broad principles of that wonderful place leaving details to be modified or altered to meet the local requirements Here, for instance, we do not run ' a school card' but just have the ordinary three categories attending, light duty and sick Some importance has been attached to a satisfactory definition of light duty, and in conjunction with the executive officer it is now clearly laid down that, among other things, boys on this list are not called on to double (*Reference to this will be made later.*)

The sick bay fulfils a very definite and useful function with its twenty-six beds Its scope is limited to the treatment of such cases as may be expected to be back at duty within a week e g, vaccinias, colds minor injuries and the like Great stress is laid on the importance of boys not losing touch with the ship, especially in the early stage of training By taking these types of cases into wards they get, we trust a favourable impression of sick bays in general and the knowledge that if they fall ill the person to come to with confidence is the medical officer First impressions in the way of medical treatment in any service usually remain, and therefore one hopes that without the slightest need for "sloppiness" the boy patient can be depended upon to consult his medical officer in later years as a man. All our serious cases, and any likely to be some weeks before returning to duty are taken into R N H, Haslar, whose assistance and help we very much appreciate Not only does the hospital provide ambulances, do our operative x-ray, and bacteriological work &c, but the specialists examine and advise on all cases about which we are in doubt The question has been put to me by civilian friends as to whether a sick bay is needed with such a magnificent hospital so close The answer is in the affirmative, for the patients seen in

our wards form only a fraction of the multifarious activities of the sick bay. There is of course a large out patient list, fresh cases arriving at all times of the day and some at night, vaccinations and inoculations, medical inspections, drafts, examination of civilian employees, and the hundred and one other things that go to make up a busy day.

There is a type of case which only needs a two or three days' rest away from bugles and all they stand for. It is not that the boys are hard driven but life is strenuous, and some of the smaller or less robust sometimes show signs of staleness. It is a remarkable fact that so many of these cases practically sleep the clock around the first twenty four hours after admission. Forty eight hours in the sick bay sends them back to duty quite fresh and with a minimum loss of instruction. It can be said that boys give no trouble as patients, and being responsive to kindness, discipline as understood in a general way is unnecessary, so quickly do they sense the little required of them in the way of routine and behaviour.

All boys are great readers, and though fond of the ordinary authors, yet nearly all of them retain a liking for the small printed papers, price twopence, containing a detective or school yarn. It is hoped a wireless set adds to their amusement, but a constant supply of literature and, when money permits, of a few good games, is of great importance. I think the round of the wards at six o'clock is one of the most pleasant duties. With the main troubles of the day over the medical officer has the opportunity of passing the time of day with the patients. There is always some topic of interest, whether it be why their favourite club lost the English Cup or how they earned thirty shillings a week working in a coal mine prior to joining up. Often, too, one can find out their difficulties or small worries, whether it be gunnery or school, and, working as one does in close conjunction with their divisional officers, more than one ghost has been laid in the sick bay. All this is for the general good and in no way demands spying or psycho analysis, but only a friendly interest in their progress and daily life.

Housing, Bathing, Clothing, &c.

The *St. Vincent* is designed to accommodate 700 boys, but it is unlikely we shall reach that number for a while. The boys are housed in four blocks, with a separate building for new entries to which a reference will be made later. The dormitories are excellent and central heating is installed, though not everyone is enamoured of radiators, which so often function in full blast or not at all. Here great stress has been laid from a medical point of view on the importance of the dormitories being warm not only when the boys turn in, but from 2 a.m. until they have finished dressing. For I believe these to be danger hours during the winter. The depressing effect of cold and artificial light will often turn the scale in cases where boys are just a little out of sorts. The temperature has been worked out with great care by two experts, and the results have been

excellent, ensuring a comfortable warmth to start the day with. For the same reason fires in the schools are lighted well in advance, instruction there during the winter forming the boys' pre-breakfast activity in work. Nobody's brain will function if at the other end there are cold feet.

The main system of bathing is that of the hot and cold shower baths. It appears to me to fulfil what is required in a very satisfactory manner. Apart from routine times, boys are encouraged to make use of them after games, &c., and of this they take full advantage. The laundry for washing clothes is again quite good and possessed of a very efficient drying apparatus. The dressing room now fitted to the bathroom and laundry will add much to the boys' comfort.

Their kit reaches, of course, the usual high standard of all Admiralty issues. I think it would be a great benefit if greatcoats could be issued to boys as part of their kit during actual training, though the objections are obvious. Our climate being what it is at Christmas and Easter, and boys what they are, a greatcoat would be of great value in preventing chills and worse things on coming out at night from overheated cinemas and similar places.

Dietary

This is on a very generous scale and well varied, which is as it should be, remembering the active life of the boys and their speedy development. It is difficult for some of us to think in terms of calories or vitamins, but too much importance cannot be attached to daily fresh vegetables. Marrowfat peas or the like should not find a place in a shore establishment unless, as here, fruit of some sort is issued as well. The criterion should not be the bulk issued in a term, but the number of days on which such things form part of a ration as opposed to cabbage, &c. For these young sailors must be regarded as always in a high state of training apart from actual athletics, so are open to boils and blains. There is no doubt that these painful and troublesome ills are discouraged by fresh vegetables. The method of issuing dinners and the accuracy of the young cooks in dividing up the food fairly for such large numbers is well worth seeing by any visitor to the *St. Vincent*. It is only equalled by the speed with which dinner is got through, two large courses disappearing in under seven minutes. As indigestion is unknown here one can conclude that it is good to be young. Food being one of the factors in development, it is interesting to know that in the course of nine months the average boys put on eight to ten pounds in weight and two to three inches in height. There is, of course, the proverbial small boy who refuses to grow up.

Physical Training and Games

Physical training, in which games play a large part, forms a very important feature of their course. The difference in physique of the recruit on the day he joins and when he goes afloat as a fully fledged boy

some nine months later is really remarkable, and is a tribute to the scientific training of the P and R T branch. Where legislation must be for the many and not for the individual, the medical officer is in a position, without being officious, to see that no undue strain is put on boys who have recently come out of hospital or the sick bay, or are not quite fit for some reason or other. A distinguished officer inspecting the *St Vincent* counselled me *to visualise*, and there is nothing more essential than that we should look to the years ahead and be certain the seemingly perfectly developed boy or great athlete of to-day may not be the potential invalid of to-morrow. Apart from recommendations from R N H, Haslar, more especially after operative treatment for appendicitis, &c, I think it is essential that boys after illness should, so to speak, have a little breathing space before joining up into the full activities, in other words, a short period of light duty between doing nothing at all and doing everything. It is equally important that boys who are good at all forms of sport should not overdo things in their enthusiasm and attempt too many competitions all happening about the same time.

Though hampered for the moment by excessive demands for ground space, it is remarkable how boys have taken to hockey and Rugby, both of which are for the most part new to them. There will always be the problem of the boy who is no good at games and has no liking for them. The policy here of not forcing them to play beyond moderate requirements is sound, and they probably derive as much good from reading a book in the open as from playing games for which they have very genuine dislike.

Swimming is of great interest to the medical officer, for it embraces the problem of the so called backward swimmer, about whom sooner or later he is usually asked to suggest a reason. Anyone who has been on the medical staff of a barracks knows how difficult this question can be, for backward swimmers are found in men and officers whose courage it is impossible to doubt. So it is worth thinking about and endeavouring to scotch the particular fear which lies behind these cases. In one group dread of the water can be traced back to some thoughtless and stupid practical joke played on them in earlier life; in another, the suspicion that they will go under and be drowned without anyone being the wiser, especially if it be a large bath; in a third case, that the duck suit worn for passing out will fill up and drag them to a watery grave, and so on. Here the problem has really been almost non existent owing to the great care and trouble taken by the boys' officers and instructors, and I think the intimate size of the covered swimming bath, together with the fact that boys of necessity are not forced to go in the deep end at the first go, have been important factors. The policy of the deep end for novices, if at all water shy, has never seemed to me to have many points in its favour, but was probably looked on as a good joke thirty years ago.

Recruits and Recruiting

We started receiving recruits on June 6 1927 and up to April 1, 1928 have entered 381. It should be noted that from a medical point of view they are finally entered and, except under exceptional circumstances it is not permissible to make any further medical examination. It may be said that boys passed through naval barracks come to us very rarely with any disqualifications but remarks such as slight flat foot and the like are not infrequently seen on the papers of those examined in the provinces. Having done recruiting duties at one of the barracks for a year, one realizes it is an advantage often to have a second opinion on any apparently slight defect which may be increased or brought out in the service. It may be also that naval medical officers on the active list are inclined to be more rigid in their standards from their intimate knowledge of the sick in hospitals or ships. Our recruits come from the surrounding counties London and the north and in addition boys are received from Greenwich School and certain training ships of which the chief are *Warspite*, *Arethusa*, John Watts Naval School, *Mercury*, *Exmouth* and Penarth Nautical School.

As we progress more and more boys come from homes in and about the Gosport and Portsmouth districts, whilst almost all the Greenwich contingents have relatives or friends near by. Some importance is attached to seeing all recruits on joining. It is very interesting in course of casual conversation to find out something about their homes and previous occupations. It affords one a chance of assessing their probable capabilities and is useful from a point of them all being potential patients. An attempt is made here to remember what they tell you against the day when they may become your patients.

The Greenwich School boys are the smallest in physique on arrival and this is probably because many boys are admitted there on compassionate grounds. However they soon grow. I think there is a very good type of recruit coming in now, both physically and mentally. The recruits at first are housed and fed in the new entry blocks, which are exceedingly comfortable even running to long baths and are complete with recreation rooms, &c. They do not come into contact practically at this stage with the others. It is our custom to spray their throats for a week in the hope that we are warding off possible infectious trouble but perhaps we are optimistic. All new entries are vaccinated unless done very recently. It is remarkable the number who have never been done but such is the law. These boys fall into the routine with surprising quickness in which they get every possible help from officers and instructors.

Communication with Parents

With the concurrence of the commanding officer, it is my custom to write a personal letter to the parents or guardians of all boys sent into the R.N. Hospital. Official forms must of necessity be brief and to the point and

I think, often fail to reassure relatives in the way that a few lines from the medical officer do It is, of course inconvenient in busy moments, but is well worth it as most grateful letters are received, many of them speaking highly of the care shown our boys in hospital For similar reasons our patients are visited regularly in hospital Operative cases, and fractures in particular, are there for some weeks so these visits prevent boys from thinking they have been forgotten One gives them the news of the ship and takes away news of their progress and so forth for the benefit of the officers generally The chaplain who takes up their pocket money, is always welcome

Sick List

Our sick list varies very little in nature from that of any similar ship, and calls for little comment Injuries sustained either at games or in course of P and R T instructions are always a feature The vaulting horse would seem to me to be the main offender, not that any precaution is neglected but owing to the fact that boys pitch or fall as they term it *awkward like* One boy has succeeded in sustaining not one but two fractures in one case [illegible] arm and on the other occasion a leg This however is a unique case

Vaccinia accounts for another large group, despite the care taken in vaccination It is not surprising that the boys who have not previously been done react with some vigour Of skin affections determined efforts have been made to defeat that irritating complaint impetigo, with its [illegible] habit of attacking the more inaccessible and difficult areas of the face and ears Considerable importance is attached here to taking cases of moderate severity into the wards It has been found to achieve quicker results These cases require time in dressing, difficult when there is a large attending list, there is the risk of spreading the infection as an out patient, the uncertainty that the bandages are always kept on at night, together with their depressing appearance As one of my captains pointed out to me impetigo is a depressing disease It is quite true and he showed acute observation All varieties of local treatments have been tried, but there is no one cure, for all cases vary in reaction and resistance It is thought well to bandage these cases in order to prevent patients touching the affected areas especially during sleep Of preventive measures sterilization of towels and exclusion from the swimming bath, as in all skin cases, appear to be of some use The spreading of the towels at the foot of each bed in the dormitories instead of all being hung on a common line is a good scheme and was suggested by a divisional officer This complaint can, [illegible] be treated and there is no shame in confessing that occasionally it has defeated us entirely and the R N Hospital has come to the rescue

As regards infectious diseases we have been lucky, for the total for nine months has been seven cases of mumps, and four of scarlet fever These have occurred among new entries, and fortunately have been confined to them Whilst it is doubtful how far some of the minor measures taken

to limit the spread of infection are of [illegible] value [illegible] I think [illegible] be well to go on with them pending [illegible] knowledge [illegible] infectious [illegible] in general. Precautionary measures have a good [illegible] effect on the situation.

Health Lectures

These are given weekly to successive batches of recruits the object being to talk informally to a small number of boys rather than give what would be a lecture at intervals to as many as fifty and upwards. This is, I think, an important point and for which suggestion I am indebted to Surgeon Captain Denny. The subject matter has been gradually worked up partly from my own observations and partly from hints received from other officers. It is hoped that what is said in the most simple way is of some help to them as regards health and comfort. A more advanced talk is given to all drafts for sea and touches the question of alcohol and allied subjects.

Leave

Leave obtains here three times weekly, with occasional week ends in approved cases. No ill effects have been observed from boys going into cinemas or being given free latitude in Gosport or Portsmouth. As time goes on I hope to see more and more boys with their homes locally. All of us have unlucky days, and it is a good thing for boys to be able to go home and occupy the best armchair for an hour or two. It gives them a chance of recounting their triumphs, or being encouraged in their moments of disgruntlement. It is pleasant to see boys returning from afternoon leave to the barracks accompanied by their parents or relatives.

Conclusion

There is no happier life I am convinced for a boy than that of the training service. It is noticeable that as much (if not more) attention is paid to the backward boy as to the outstanding successes. If a boy fails for other reasons than those of health then it is due to inherent defects.

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[illegible] MALARIA AT H.M. NAVAL BASE, SINGAPORE

[illegible]

[illegible] two [illegible] the Singapore Base [illegible] the incidence of malaria during this period and to [illegible] the various measures taken to combat the disease [illegible] to this [illegible] consider the prevalence of malaria in the Malay States and [illegible] in the Island of Singapore. The following details and figures [illegible] from the reports of the Medical Department of the Straits Settlements.

Health of the Year [illegible] The death rate is the lowest recorded. [illegible] As [illegible] the [illegible] months [illegible] quarter were the healthiest months of the year, in these months [illegible] from malaria, pulmonary tuberculosis and pneumonia are at a minimum. The second quarter is sometimes the most unhealthy, especially in Singapore, owing to the damp heat accompanying the change of the monsoon in April and May, which is most prejudicial to dwellers in a large and crowded city. In 1925, however, the last quarter of the year was the least healthy, due to a heavy mortality from the three diseases mentioned above, but for which the record of the year would have been a good one. The increase in malaria is partly attributable to the great amount of new land being opened for rubber cultivation, owing to the high price of rubber. In addition to persons who contract the disease in the Colony, many malarial cases drift into Singapore from the unfederated State of Johore, and into Penang from the unfederated State of Kedah, and enter our hospitals, and thus swell our sickness and death rates. The fact that nevertheless the death-rate, 27.26 per thousand, is the lowest on record is due to a considerable fall in Malacca and a slight fall in Penang Settlement, which were nearly counteracted by a rise of 1.12 per thousand in Singapore.

Health of the Year 1926. — The year was not only in the Straits Settlements but generally throughout Malaya the most unhealthy experienced since the influenza pandemic occurred in 1918. During the last quarter of 1925, there had been a definite increase in the incidence of malaria and pulmonary diseases. This increase persisted in January, February and March, almost invariably the coolest and healthiest months of the year, but which in 1926 experienced an unusually low rainfall. With the continuance of very hot and dry weather in April, the death-rate from malaria and pneumonia and the infant mortality rose to altogether abnormal heights, diminished only when the better rains and cooler weather were experienced in September and October, but still remained above normal during the last quarter of the year. The first half of the year was everywhere much drier than the average. In consequence, many anopheline breeding grounds

from which the larvae would usually be washed out by rainfall before maturity, went unflushed with a resultant increase in dangerous mosquitoes and in malarial infection The great increase in *Anopheles ludlowi*, the brackish-water breeder, in all the tidal swamps during the dry months, created a menace impossible to deal with adequately More permanent measures have in the past been taken against *Anopheles maculatus* the prime cause of malaria arising from ravines and hilly land and the damage done by this pest was proportionally less than by *A ludlowi* Minor causes which helped to increase the death-rate were the large amount of building and of opening up of new agricultural ground all over the country which always tend to produce new seepages, and the tremendous influx of new labour The first half of the year 1911 approached the first half of the year 1926 in dryness The death rate in 1911 was 46 6 per thousand for the year, a record which has been unequalled even in the influenza year 1918 The deaths from malaria and fever unspecified in 1911 were 5 281 and 4,825 making a total of 10 106 It is certain that but for the anti mosquito measures which were commenced in 1912, and which have been carried out with increased intensity since 1921 the death rate in 1926 would have been much greater

Health of the first Half Year 1927 — The health of the Colony for the first half year has been fair The death rate is 32 80 per thousand, as against 32 45 for the first half of last year The mortality from malaria has dropped on the whole, the ratio per thousand being 5 78 against 6 35 in the first half of 1926

Death rate in the Straits Settlements —

Year	1922	30 53 per thousand	Year	1925	27 26 per thousand
	1923	27 33		1926	31 81
	1924	27 42	First half year	1927	32 80

Deaths from the Commoner Diseases —

	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Malarial fevers	3 977	5 430	1 469	4 201	6 162	3 043
Fevers unspecified	3 061	5 946	2 706	2,275	2 798	1 095
Tuberculosis	2 944	2 683	2 189	621	2 526	1 424
Beri beri	1 398	904	381	967	1 098	770
Dysentery	1 065	839	642	842	1 115	485
Diarrhoea	467	415	592	1 043	1 101	558

Number of Cases of Malaria treated in the Hospitals of the Colony —

	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Cases	8 989	5 297	2 115	7 01	15 275

Deaths from Malaria in the Singapore Municipal Area —

Malaria	262	1 [illegible]
Fever unspecified	345	380

Death rate in the Rural Area of Singapore —The rural area is 188[illegible] square miles, and has a population of 80 148

Year	Population	Total deaths		Year	Population	Total deaths	
1921	68 004	2 161	31 77	1924	76 200	1 557	27 [illegible]
1922	70 192	1 948	28 17	1925	77 719	1 924	25 05
1923	72 861	2 019	27 71	1926	80 148	2 657	33 90

[illegible] *H M Naval Base Singapore*

[illegible] spleen rate [illegible] the children [illegible] the year 1921 and 1926 —

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

[illegible] the [illegible] Causeway and [illegible] of the Naval Base is included in the [illegible] The [illegible] of the rural area designated by the Rural Health Authorities are not strictly in accordance with those shown on the map

To summarize the above details and statistics The year 1925 was very healthy with the exception of the last quarter, which showed a marked increase in the incidence of malaria and pulmonary diseases the year 1926 was unhealthy throughout and there was a marked increase in the amount of malaria especially during the period April to September the year 1927 though the amount of malaria is slightly lower, bids fair to rival 1926 as an unhealthy year

H M Naval Base Singapore

M[illegible]

Th[illegible] malaria in Malaya [illegible] *A. ludlowi*. [illegible]

A. maculatus is the most potent [illegible] water and seepages open to sunlight [illegible] pupal stages is a somewhat precarious one. The frequent heavy rains tend to wash it from its natural breeding places. For this reason it is most prevalent during the drier months, and prolonged periods of dry weather are favourable to its propagation.

A. umbrosus breeds in jungle and dense undergrowth. Wet weather is favourable to its breeding, and in consequence it is most manifest during the wet weather.

A. ludlowi breeds in brackish water and in some salt water swamps. The drier months are more favourable to its propagation.

The incidence of malaria shows two distinct waves in each year. One occurs during the drier months and is due to *A. maculatus* and to *A. ludlowi* in some of the coastal areas. The second wave occurs in the wetter months at the end of the year and is attributed to *A. umbrosus*.

Incidence of Malaria at H.M. Naval Base

The attached chart shows the incidence of malaria on the Naval Base from August, 1925, to October, 1927. The chart also shows the rainfall, the number of new men engaged in each month and the monthly total of the labour force. In compiling the chart only fresh infections of malaria are considered. In some cases it is not possible to differentiate between fresh cases and relapses. The history, the physical condition of the patient and the examination of the blood with the early appearance of gametocytes in the relapse cases have been the main guide. It is safe to state that the actual number of fresh infections was less than the numbers shown. The chart shows a wave of malaria from August, 1925, to January, 1926, followed by a sharp decline and a well-marked remission of three months. This remission was followed by a sharp rise in May 1926, and the incidence of the disease continued high during June and July. There was a sharp decline in August, a slight wave in October, and after that date no true wave of incidence. It is apparent from the chart that during the first year's work we had a fair amount of malaria. The incidence of the disease during this period showed the characteristic waves of the wet and the dry season. After July, 1926, we had little malaria, showing no waves of incidence and comprised of a series of intermittent infections.

In the Malay States generally there was an increase in malaria during the last quarter of 1925. This increase, persisting during January, February and March, reached abnormal heights during April and May, declined during September and October, but remained above normal during the last quarter of the year. During the initial half of 1927, the amount of malaria

[illegible] the Malayan figures are based on [illegible] it is safe to say that the anti-malaria [illegible] were responsible for (1) the later [illegible] few cases in the spring and summer [illegible] in malaria after July 1926

Antimalaria Measures Employed on Naval Base

It is [illegible] to discuss the anti-malaria measures (of which Surgeon Commander D. H. C. [illegible] R.N. was in charge) employed, the date on which these individual measures became operative and, if possible, to trace their connection in the control of the disease. These measures may be classed as direct and indirect and are enumerated below.

(1) *Engagement of Healthy Coolies.*—All coolies were physically examined and those showing evidence of malaria infection were rejected. It is not possible to weed out all cases of malaria infection; a proportion of coolies infected with malaria will show no evidence of the disease. These cases not only provide a reservoir of infection but in time relapse, and a certain number of these relapses are mistaken for fresh infections. From the chart it would appear that the entry of new coolies has a distinct influence on the incidence of malaria, though it may take a month or even two months before this influence becomes manifest.

(2) *Hookworm Treatment.*—All new entries received hookworm treatment—oil of chenopodium and carbon tetrachloride. Though an indirect measure, it is important in maintaining the general health of the labour force. The prevalence of helminthic infection in Malaya is shown in the following figures compiled during the hookworm campaign in Malacca. Of 16,636 people examined 14,173 were infected with hookworm; 73·2 per cent. were infected with hookworm; 31 per cent. have their hæmoglobin definitely lowered; 5·9 per cent. have their health seriously impaired; 66·2 per cent. have round worm; 7·6 per cent. are free from intestinal parasites; 92·1 per cent. have at least one sort of worm; 70·7 per cent. have at least two varieties of worm; 43·4 per cent. have at least three varieties of worm; 0·2 per cent. have at least four varieties of worm; 8·1 per cent. of 48,825 admissions to the hospitals of the colony were diagnosed as primarily hookworm disease.

(3) *Proper Housing and Sanitation.*—The coolie lines were built of wood with atap roofs, the floors being about 6 to 8 feet above ground level. The space under each line was concreted, and had concrete inverts to take the rain water from the roofs. The interior of the lines was limewashed, the wash being renewed at frequent intervals. Oil lighting was later replaced by electric light. Each coolie was allotted a marked area of floor space. There was no overcrowding and adequate ventilation. Pail closets with disinfectant were in use, and were removed daily by a Chinese contractor. All refuse was burned in an incinerator. Water was pumped from two wells to several large tanks distributed through the lines. All

[illegible] and undergrowth within 100 yards of the lines were removed, and the resident grass and lalang was kept close cut. The sanitation organization and discipline of the lines were under the charge of a European supervisor. The construction of these lines was started in September 1925 but they were not completed until April, 1926. At the start of operations our coolies were living in the native village at the fifteenth mile. Some, however, were living in two old and ramshackle buildings on the site. As accommodation became available, coolies were transferred to the new lines, and by January 1926 the great majority were living on the site.

(4) *Isolation from Native Communities.*—If native villages and hovels exist within a reasonable walking distance a certain number of coolies will take up residence therein, however favourable may be the accommodation provided for them on the site. Others will go to these villages to drink toddy, become drunk and spend the night in the village or in the open. Still others will visit the villages for sexual purposes, and a village in the vicinity of a large coolie line is bound to harbour a large number of prostitutes. Such was one of our difficulties. The native village at the fifteenth mile proved a centre of attraction for our coolies. It harboured a large number of malaria cases, who found their way across the Straits from unhealthy plantations in Johore. A malaria carrying mosquito *A. umbrosus* was breeding in the mangrove jungle on its outskirts. Though we had no jurisdiction over the village, we made a frequent house-to-house visitation, encouraged the inhabitants to come to us for treatment and on several occasions took malaria cases into our hospital for treatment. After continued representations to the Government Authorities of the menace provided by this native community on our boundary, the village was finally evacuated in December 1926.

(5) *Early Diagnosis and Efficient Treatment of Malaria.*—The native hospital in the coolie lines was available for use in the latter half of December 1925. Prior to this we were obliged to send all our malaria cases to the General Hospital Singapore. This proved a most unsatisfactory procedure: coolies disliked going to the hospital and, on occasions refused to go; cases frequently returned after a few days with sexual and asexual forms of the malaria parasite still present in their blood. We had no proper surgery or offices, and it was difficult to muster cases for routine quinine treatment. The provision of a hospital enabled us to put the treatment of malaria on a much sounder basis. Sick coolies liked to be treated in a hospital on the site and in consequence reported immediately they felt ill. The following is a list of the measures used in the detection and treatment of malaria:—

(a) All sick reported at the morning muster and were sent to the hospital.

(b) No sick were allowed to remain in the lines. The supervisor was responsible for visiting the lines each morning, and sending any sick therein to the hospital.

(c) [illegible] were seen by the M.O. at [illegible] each morning

(d) [illegible] with fever or other possible [illegible] symptoms had their blood examined for parasites

(e) Malaria cases were treated in hospital for ten to fourteen days, receiving 30 gr. of quinine bihydrochloride per day

(f) Malaria cases had to be in bed with mosquito net in position from [illegible] till [illegible] a.m.

(g) On the [illegible] each case received hookworm treatment and had thick [illegible] films examined for parasites

(h) When parasites were not detected, when there was no splenic enlargement, and when the patient's condition was satisfactory, he was discharged to work with the so-called "malaria gang"

(i) The malaria gang were not employed on any strenuous labour. They were under the charge of a "mandor," who was responsible for mustering them morning and evening at the hospital. On each of these occasions they received 10 gr. of quinine bihydrochloride

(j) The malaria gang were seen once a week by the M.O.

(k) After a month in the malaria gang if there were no contra-indications the man was discharged and joined his own gang

In the later stages there were not enough cases of malaria to justify a malaria gang. Men were allowed to join their own gangs on the understanding that they attended regularly for their quinine. If a man failed to attend for his treatment his name and number were sent to the muster station and he was not taken on for work till he had reported at the hospital. One of the difficulties in treating the malarial cases is the question of pay. Whilst a coolie is in hospital sick he receives no pay. Once he is rid of his pyrexia he expresses his desire to return to work and it is difficult to convince him through the medium of the native dresser that it is in his own interest to remain a further week in hospital. I am of the opinion that it would greatly facilitate the early diagnosis and efficient treatment of malaria if the cases received a certain proportion of their pay whilst in hospital

(4) *Measures Directed against the Transmitting Agent.*—All swamps and ravines within 800 yards of the coolie lines were cleared, drained and put into such a condition that the grass and lallang could be cut with a reaping machine. In August 1925 a start was made in the ravine nearest the site of the lines and by April 1926 the main drainage of all ravines within the 800 yards radius had been completed. A close supervision was kept on the drained areas for the appearance of seepages and anopheline breeding places. Outside the drained area a daily search and identification of larvæ was instituted. Close watch was kept on the areas where coolies were working, more especially where night work was in progress. In this country there are many enemies of the mosquito larva. To protect these natural allies, oiling was only employed in those areas where actual breeding was in progress. Each night the hospital dresser made a collection of all the mosquitoes found on the nets of the patients

[illegible] In [illegible] [illegible] the Naval [illegible] [illegible] Malaria [illegible] [illegible] pools along the temporary roads. Of [illegible] occasional larva of *A. maculatus* were [illegible] was captured in the hospital. On one [illegible] the construction of the water supply—[illegible] many numbers. *A. umbrosus* was found [illegible] River House Area before that area was [illegible] over 800 yards from the lines, many [illegible] immediate neighbourhood. The same mosquito was breeding [illegible] of the native village at the fifteenth mile and in the mangrove [illegible] our Eastern boundary. *A. ludlowi* was found once—July [illegible] on the foreshore near to the dredger and hoppers.

Each fresh case of malaria was questioned to elicit the following information: (*a*) Where he was living. (*b*) Where he was working. (*c*) Whether he had been absent from the site. As a result of the information gained we were faced with the fact that on several occasions fresh cases of malaria were occurring [illegible] amongst gangs working by day in certain localities. The most striking illustration of this is as follows. In the initial half of April 1921 we had three fresh cases of malarial infection. In the latter half of the same month we had six fresh cases, the individual cases reporting on the 16th, the 20th, the 21st, the 22nd, the 24th and the 30th. All these men were working in the Naval Valley constructing the water supply and were only working by day. During this time there was no fresh case of malaria amongst the bulk of the coolies who were working elsewhere. These facts led us to presume that some if not many of our malaria cases contracted their infection whilst working or resting during the day. This assumption was further strengthened by the entire absence of malaria from the women and children living in the lines. For the past two years there have been women and children in the lines over fifty of each in past year.

I would give the following instance to illustrate how localized malaria may sometimes be. During the months of June, July and August 1921 we had only three fresh cases of malaria, all occurring in the first week of July amongst the crew of [illegible] attendant on the dredger which was working about 200 to 400 yards from the [illegible]. There were six hoppers attending on the dredger and all were [illegible] employed. All three cases occurred in one hopper and all three were employed in the engine-room. It is possible, even probable, that all three were infected from one mosquito which had taken up residence in the engine-room. *A. ludlowi* was found to be breeding on a small strip of the foreshore about 400 yards from the dredger. After spraying the vessel and dealing with the breeding place, no further cases occurred.

[illegible] OF THE INDIVIDUAL ANTI-MALARIA M[illegible]

The[illegible] pitfalls and fallacies in the interpretati[illegible] especially w[illegible] many and gradually progressing fact[illegible] The foll[illegible] [illegible]pretation of the foregoing facts and fig[illegible] [illegible] the influence of the various anti-malaria measures [illegible] [illegible]d.

[illegible] Healthy Coolies.—If the line showing the total number [illegible] with that showing the new entries, it will be seen [illegible] proportion of the labour force is always changing and that [illegible] force at a strength of 1,000, it is necessary to take [illegible] each month. Another outstanding feature of the [illegible] curve of new entries exercises a distinct influence over the [illegible] incidence and this influence is manifest two months later. [illegible] well marked in the end of 1925 and during the whole of [illegible] the relative height of the malaria curve is naturally higher durin[illegible] malaria epidemic of the Spring 1926. During 1927 the influ[illegible] less marked and this can partly be accounted for by the fact that [illegible] our new entries were coolies who had previously been in our employ [illegible] rejoining us after a stay in India. This influence cannot be [illegible] for on the supposition that most of the cases shown as fresh infections were in reality relapses: if so, why should the relapse be delayed till the second month? It would be more logical to presume that certain [illegible] these new entries were latent carriers providing a nidus of infection, and it emphasizes the importance of medical examination. I am quite convinced that had medical selection been omitted, our figures for malaria would have been much higher.

Hookworm Treatment, Proper Housing and Sanitation.—As these measures are designed to promote the general health of the labour force, it is not possible to trace any definite influence on the malaria incidence.

Isolation from a Native Community
Early Diagnosis and Efficient Treatment. }—Though unrelated, I am obliged to bracket these measures as they came into operation about the same time. During the latter half of 1921 a large number of our coolies were quartered with the native community outside our boundary; by January 1926 most of these had been transferred to our newly built lines. In the latter half of December 1925, the native hospital in the lines was available for use. Let us again compare our curve of malarial incidence with the following details of the health of the general community of Malaya for this period: "During the last quarter of 1925, there has been a definite increase in the incidence of malaria and pulmonary diseases. This increase *persisted in January, February and March* [illegible] in April the death-rate from malaria, pneumonia and the infant mortality rose to [illegible]normal heights [illegible] diminished only in September and October, but still remained above normal during the last quarter of the year." This comparison shows that, in addition to a marked remission in the incidence

malaria during February March and April we had [illegible] earlier fall in the spring and summer epidemic of that year It might be argued that our remission was due to the elimination of relapse cases from our figures Such is not the case the total number of our malaria cases relapse and fresh infection for the months of February March and April are three two, and eleven

As already pointed out, the native village at the fifteenth mile was not evacuated until December 1926 The effect of this evacuation is hard to trace in view of the many other factors in operation at this time but one might point to the low height of the so called "maculatus wave" in April May and June 1927 The site of the European quarters are less than 200 yards from the site of this village During 1926 three Europeans contracted malaria, so far in 1927 no European has contracted the disease

Measures Directed against the Transmitting Agent—In placing this last I do not wish to insinuate that it is least in order of importance but rather to emphasize that it is the basis supporting the whole of the previous measures Without it the influence attributed to the previous factors would be much less marked Being a gradual process, it is not easy to point out its effect at any one point, but its influence may be gauged by comparing the amount of malaria in the first twelve months with that in the ensuing period

[Thanks are due to the Council of the Royal Society of Tropical Medicine and Hygiene for the loan of the blocks, and for their kind permission to reproduce the graph from *Trans Roy Soc Trop Med*, xx No 5.—EDITOR]

UNDULANT FEVER ALSO KNOWN AS MEDITERRANEAN OR MALTA FEVER

A Memorandum submitted by the Members of the Camera Medica of Malta and of the Malta Branch of the British Medical Association pleading for the discontinuance of the geographical designations of this disease and the general adoption of the name Undulant Fever

(1) A SUITABLE and generally acceptable designation of this fever has long been the subject of discussion The disease is one of those that have been labelled with a multitude of names thirteen appellations have been given to it on account of its supposed resemblance to typhoid or malaria the character of its fever and the symptoms it presents gave rise to fourteen other designations and nine more were derived from the conditions which from time to time were considered to favour its prevalence From the localities in which it was recognized and studied it came to be called Mediterranean fever Malta fever Italian fever Neapolitan fever Rock or Gibraltar fever Cyprus fever Crimean fever &c

(2) The name "undulant fever" originally proposed by Captain

M. L. H[illegible] M[illegible] staff in 1897, was [illegible]mended by the Internat[illegible] M[illegible] held in London in 1913, and [illegible] the [illegible] English writers. The terms "Malta" or "M[illegible]" are still frequently met with, and the [illegible] is to point out the objections to the use [illegible] to make an earnest appeal to all medical and [illegible] writers [illegible] them in favour of the more proper and less [illegible] one—undulant fever.

The term "undulant fever," though not perfect, is the most suitable [illegible] this [illegible] in the present circumstances. As Hughes had [illegible] of the most constant and characteristic features [illegible] the undulations of the temperature curve. The [illegible] the primary, in many cases the only, clinical [illegible] illness, and although the curve may not always be of [illegible] type, yet the phenomenon is sufficiently frequent and [illegible] the word "undulant" as a term which [illegible] to any person the principal clinical feature of the [illegible] the designation "typhoid fever" in general use [illegible] which the "typhoid" state is a frequent and salient but [illegible] symptom—and even more so the term "relapsing fever" [illegible] the variations of the temperature.

[illegible] "undulant" has so far been used only for this disease, it [illegible] to ambiguity and does not offer the same draw[illegible] "remittent" and "intermittent." Hughes had also [illegible] it has a familiar sound, slips easily and lightly from [illegible] easily translatable into any language from the Latin form [illegible]. Its use has been accepted by many authorities [illegible] been called to the matter, and is continually gaining [illegible] writers. It appears in fact to have stood the test of [illegible] excepting the objectionable geographical names, no [illegible] more frequently used as a designation of this disease [illegible] new name does not appear to be opportune at present.

[illegible] agreed that geographical names given to specific diseases are [illegible]le from a scientific point of view. They are mainly relics of the [illegible] the miasmatic theory of disease held sway and each kind of [illegible] was considered to be caused by "infective emanations" inherent to [illegible] particular country or locality where it prevailed. They have no [illegible] whatever to the symptomatology of a disease, or to any of its [illegible] features, and are neither characteristic nor significant [illegible]. As Sir William Aitken said when advocating the use of a [illegible] nomenclature of diseases: "Except as matters of history and as [illegible]tions to warn us from a greater danger to science, let these and such [li]ke names be consigned to oblivion." And, as a matter of fact, the disease [w]hich forms the subject of this communication appears to be one of the [ve]ry few for which a geographical name is still in use.

(6) A consideration [illegible] fevers for [illegible] brings home very clearly the part which the use of geographical names plays in helping to retard progress in the unravelling of the [illegible] and ætiology of diseases. This is specially evident in connection with the Mediterranean group of fevers. Under such names were frequently [illegible] together indiscriminately such diverse diseases as typhus and typhoid, yellow fever, another fever accompanied by jaundice of doubtful [illegible] fever, relapsing fever and probably malaria cases and other feverish diseases which are still unclassified.

(7) The name "Malta fever" was eventually assigned to the long continued fever of the undulant type comparatively recently. Formerly by "Malta fever" or "Maltese fever" was understood the simple ardent fever of short duration now known as phlebotomus fever. Marston, who was the first to give a detailed description of undulant fever in Malta (*Army Medical Report*, 1863) called the disease "Mediterranean or gastric remittent fever," and clearly differentiated it from "simple ardent fever" which he continued to call "Maltese fever." Boileau (1865) described "Malta fever" as "a pyrexia with sudden onset terminated in seven days by lysis." Later on the term came to be applied also to fevers of longer duration. (Maclean, Wood, Notter, 1876.)

It is evident therefore that the designation "Malta fever" cannot be retained for the fever of the undulant type on the plea of length or priority of use.

(8) The fact that undulant fever is not confined to the Island of Malta or to the Mediterranean needs hardly to be emphasised. It has been identified in other European regions and in widely separated localities in China and America, South Africa and India. As [illegible] it may be mentioned is it peculiar to the Maltese goats.

(9) Recent observations that the *B. abortus* of Bang may give rise to a continued fever of the undulant type similar clinically to that caused by the *M. melitensis* of Bruce would furnish a further argument against the retention of the term "Malta fever." Whatever connection there may be between the designations "Malta fever" and "*M. melitensis*," it does not hold good when the fever is due to the *B. abortus*. The adoption of the term "undulant fever" for the clinical condition, followed in each case by an indication of the causative agent, e.g., undulant fever (Bruce), undulant fever (Bang), should prove useful, as in the case of the paratyphoids.

(10) The prejudice to the moral and material interests of the island of Malta in consequence of the association of its name with a disease which is far from being peculiar or limited to the locality is considerable. The Maltese nation keenly resent the resulting stigma and feel that the reputation of their country has suffered mainly on account of the important research work on the disease that has been carried out in the island. The Government of Malta in fact has on several occasions considered it necessary to make representations on the subject.

(11) The Members of [illegible] Medica of Malta and of the Malta Branch of the British M[illegible] Association have ventured to submit the above observations in th[illegible] hope that their fellow members of the medical and allied professi[illegible] [illegible] their request into sympathetic consideration and that they will [illegible] their suggestion for the general adoption of the designation [illegible] and for definitely discarding the inappropriate geographical [illegible]

ENTOMOLOGICAL NOTES ON THE CANTON DELTA

By S[illegible] R.N.

The following is a list of the varieties of mosquitoes actually met with by the writer during two years but naturally is nothing like a complete list of those to be found. The politically disturbed condition of the country and the universal prevalence of banditry made one's scope of operations very limited. Remarks on the habits, &c. of each species are appended [illegible]

I. Culicines

(a) *Culex* Group

[illegible] *fatigans*.—Common everywhere and to be found at all seasons. [illegible] are rare during the winter months but a few will always be found at [illegible] hibernating in cabins and dark places in the ship. Larvae can [illegible] be found ashore usually in small natural collections of water and in [illegible] fields. This species varies greatly in size, the smallest being about half the size of the largest: this is particularly noticeable in those artificially bred. It is interesting to note that in the summer of 1925 in the island of Shameen (the British concession at Canton) the vast majority of domestic mosquitoes captured or bred were *C. fatigans*, the other domestic kind, *Stegomyia scutellaris*, being rare, while in 1926 the opposite was the case. In 1925 there was hardly any dengue, while in 1926 there was a severe epidemic, which bears out the conclusion of Cleland, Bradley and MacDonald in Australia that *S. scutellaris* is the vector of dengue. *C. fatigans* is reputed to be a carrier of filaria, but filariasis is rare amongst the inhabitants of the Delta.

C. tritaeniorhynchus, *C. [illegible]*, and *C. sitiens* are all common. They resemble *C. fatigans*, but all differ in having a yellow band on the proboscis and yellow banding at the joints of the legs. *C. sitiens* seems commonest near the coast, as it breeds very freely in brackish water often in association with *Anopheles [illegible]*.

C. whitmorei is easily distinguished from the former species by the white frosting of the thorax like *C. gelidus*, but while in the latter the frosting extends only two thirds of the length of the thorax in the former it extends further back and is bounded by a wavy outline. Both these are [illegible]

common and seem to prefer clear pools with a sandy bottom containing a good deal of decayed vegetable matter They are fierce biters in the early part of the evening

C mimeticus a beautiful creature has wings ornamented with bold black and yellow bars on the anterior margin so that it resembles an anopheline it is easily distinguished by the trilobate scutellum the short female palps &c The larva is usually of a bright green colour and may often be found lying motionless in hiding in the green filamentous algæ It is also to be found in clear, gently running water in association with *A sinensis* It is seldom met with in houses *C concolor*, now known as *Lutzia fuscana* has yellow dorsal banding on the abdomen like *C fatigans*, but is about twice the size, and the terminal segments of the abdomen are entirely yellow—quite visible to the naked eye. The larva is large with a markedly globular thorax and formidable mandibles and when full grown usually of an opaque whitish colour It often rests horizontally on the surface like an anopheline but is easily recognized by its long breathing tube It is predaceous and eagerly devours all other mosquito larvæ, and also those of midges (Chironomidæ) Consequently it is usually found in small numbers in the habitats of these It seems to prefer as food the larvæ of *S scutellaris* and often there will be found in an old tin, a broken flower pot &c, two or three of these larvæ waxing fat on the rest of the population consisting of scutellaris larvæ These appear to have no defence against the Bolshevik in their midst, but meekly submit to being devoured The mature insect bites and sucks blood greedily but the bite leaves no mark It is seldom seen in houses

(ii) *Aedes Group*

Stegomyia scutellaris (*Aedes albopictus*) is by far the commonest It is very small, dark blue black with very obvious white markings on thorax and bands on legs, and is distinguished by the median white band on the thorax quite visible to the naked eye It is an indefatigable day biter and seldom seen at night It frequently attacks one about the ankles while shaving in the morning and bites people under their office desks all day On account of its small size dark colour and diurnal habits it is frequently referred to as a "sandfly" by the laity It is perhaps the most active and alert of all mosquitoes and its bite is peculiarly virulent and irritating, raising a large white weal perhaps half an inch in diameter, which itches intensely The initial blanching of the area around the puncture shows that its venom must have a temporary vaso constrictor action By virtue of its small size and great activity it has remarkable powers of penetrating through the smallest of apertures In doing this it folds itself up into a diameter hardly larger than that of a darning needle and will slowly and persistently force its way through for many hours It will thus penetrate several thicknesses of fine netting (twelve meshes to the linear inch) or escape from a bottle in which the smallest groove has been cut in the cork to admit air, though it may take twelve to twenty four

hours as long so. As already mentioned it is the vector of dengue, and a closely allied species, *S. pseudoscutellaris* is, in Fiji, the carrier of the filarial form. It breeds in fresh clean rain water—usually in domestic utensils, old water pots, broken bottles, old tins, fire buckets, roof gutters, etc. In fact no such collection of water is too small for it. In this connection it may be mentioned that a few cigarette ends in a fire bucket are sufficient to prevent it. In Hong Kong dockyard it was a great pest, and could be found breeding profusely in such places as the feed cisterns attached to donkey engines, the water receptacles of grind stones, the upturned ends of barrels and the pans and cisterns of locked up water closets. It is seldom to be found in natural collections of water in the earth, but when found away from habitations as it frequently is, the usual breeding places are holes in trees or in fallen cocoa-nuts. The larva is not easily distinguished from that of Culex to the naked eye, but it has a peculiar serpentine movement and hangs almost vertically from the surface instead of at an angle like Culex.

It was observed on one occasion that, in a bottle containing a large number of these larvæ, the black vegetable detritus on the bottom of the bottle gradually assumed a vivid green colour, just as though it were covered with a new growth of some low vegetable organism containing chlorophyll. On examination, however, through a lens it was seen that the black matter ingested by the animal assumed this colour in the course of its passage through the alimentary canal and the fæcal matter passed was bright green and gradually covered the surface at the bottom of the bottle. This is probably explicable by some simple chemical reaction due to the character of the food material. But supposing this matter really were chlorophyll—what a tempting field for speculation? The conversion of the inorganic to the organic by passage through the alimentary canal of this lowly insect. An important peculiarity about this species is the ability of the eggs to survive desiccation in flower pots &c. for months. As soon as the pot fills with water again they hatch out. (Green.)

Stegomyia fasciata (*Aedes calopus*) has been found in Hong Kong, but I have not succeeded in finding it in the Delta or the West River. This species, like the last mentioned, is essentially a domestic breeder and will be found in just the same sort of places as *S. scutellaris*. It is very common in the Dutch East Indies, especially in the Moluccas. In fact in most Dutch hotels you will be able to find some larvæ of *S. fasciata* in your bath. Be it mentioned that the Dutch bath is an open concrete cistern from which you pour water over yourself with a dipper. These baths are seldom properly emptied but merely "topped up" with fresh water each day, consequently the larvæ breed freely in them. One enterprising hotel has hit upon the scheme of stocking the baths with gold fish which serve the double purpose of keeping down the larvæ and delighting the American tourist with this appearance of opulence. I have read in the newspapers that the Italian poet, D'Annunzio, always has gold-fish

in his bath. Probably his reason is as much practical as it is æsthetic. The Dutch liners in the East Indies are provided with the same kind of bathrooms as is the rule ashore, and I have actually seen larvæ in the bath-tubs. So that it seems probable that the few examples of *S. fasciata* caught in Hong Kong are really migrants introduced in this fashion by Dutch steamers from Macassar or Batavia. If this species were native to South China it would seem that it should be found in the Canton Delta.

Aedes dongalli resembles *S. fasciata* in having the "lyre" pattern on the thorax, but the markings are yellow instead of white and are much finer, while the "lyre" has a third string. It is rare and was found only in two places—once at Hong Kong on the Peak and once at How Lick, in the mountainous part of the West River. It is exclusively sylvan and breeds in hollows in the rock in mountainous streams.

Aedes vexans is a small and dull-coloured species more resembling a small culex.

Armigeres (Desvoidya) obturbans. Very common. Generally resembles Stegomyia in colouring and other characters but is about four times the size. Like all this group it is a daylight biter. It breeds in the foulest of water, its usual habitat being the tubs of fermenting urine kept by Chinese gardeners for fertilizing purposes. Though it lives in the vicinity of houses it is seldom found indoors. The larva is brightly coloured blue on the dorsum and purple on the venter, while the pupa has a golden sheen. It is predaceous on other larvæ; it is remarkably resistant to the effects of oiling.

Armigeres aureolineatus. Resembles the former but has golden scales on the thorax. Rare. Found at Wangmoon.

(c) *Mansonia group*.

Mansonia uniformis.—Uncommon. Found at Wangmoon and Samshui. It is a handsome insect of a rich chocolate colour with conspicuous yellow banding on the legs. The wings are so heavily covered with scales as to make it resemble an anopheline.

II. ANOPHELINES

The following species were found: *A. sinensis*, *A. [illegible]*, *A. maculatus*, *A. rossi*, *A. kochi*, *A. maculipalpis*.

A. sinensis.—In the lowlands of the Delta 98 per cent of the anophelines caught on board the ship or bred from larvæ found ashore were of this species, the other 2 per cent being *A. barbirostris*. These are both large insects markedly heavy in flight and sluggish in movement compared with other mosquitoes. *A. sinensis* is easily distinguished by the three white bands on the proboscis and the constant yellow spot on the tip of the wing. It breeds principally in rice fields, ponds and other permanent collections of water and prefers plenty of vegetation. It was once found breeding in

a gardener's tub in the absence of vegetation (at Canton) but this is unusual. It is a very house-haunting species. The larvæ show a remarkable variation in colour, being often of a dark olive, sometimes of a vivid green with two golden marks on the thoracic part, while others have the abdomen striped dark green and white. There seems no difference in the adults hatched from the various coloured larvæ. Though it is prevalent at all seasons it is particularly abundant in January and February, the coldest months, when the temperature may be as low as 42° F. It is recognized as the principal carrier of malaria in the Delta, and is also a carrier in Java but is not considered so in Malaya.

A. maculatus.—Found at White Cloud Mountain near Canton, in the mountainous districts of the Upper West River, and at Stanley and Repulse Bay (Hong Kong). It breeds in clear pools by running streams in the hills (Wuchow), or in small pools in low swampy ground (Fanling in the new territory of Hong Kong and Stanley Island of Hong Kong). It has been remarked by some writers that the malaria of the foothills probably due to *A. maculatus* is of a more malignant kind than that of the plains. This species will breed in the merest trickle or surface film of water, and prefers places open to the sunlight.

A. maculipalpis has the same habits as the former but its malaria carrying ability is doubtful. It is easily recognized by the tarsal segments of the hind-legs which are entirely white.

A. rossi.—Is found in the new territories, Fanling, Kowloon, Mirs Bay &c. It appears to prefer situations near the sea and will be found in small depressions such as hoof marks, &c. along the sea shore. It will breed plentifully in strongly brackish water in the absence of any vegetation. The larvæ and pupæ have a peculiar habit of making little burrows for themselves in the bottom of the pool, into which they disappear at the slightest alarm, leaving the pool apparently empty. It is not considered to be a carrier in China but is regarded with suspicion in Java.

A. kochii.—Found at Wuchow in March and April. Its favourite habitat is in fresh pools of muddy rain water, where it can be found in enormous numbers—every leaf, twig, or other floating object will be seen to have a fringe of larvæ attached to it by their tails. It is also found plentifully in the spring flooding of rice fields. It is the only one of the species under consideration which seems to prefer turbid water. The larva can be recognized with the naked eye by the large white mark on the thorax. It is generally agreed to be harmless.

General Remarks on Breeding Habits of Anophelines in this Area

All prefer (*except kochii*) clean clear water. Turbid water seems to be fatal to most. This applies even to *kochii*, as muddy though the water appears the surface water in which it lives and feeds is probably quite free of suspended matter, and it only descends to the depths when alarmed and

[illegible] on the surface [illegible] I have often observed that [illegible] anopheline [illegible] frequently dead on arrival. Particularly was this noticeable when mud or detritus from the pool had been placed in the bottle as food. This would become stirred up by the jolting of travel and the water would remain turbid. Those larvæ not already dead on arrival usually died in the next day or two. But when taken home in clean water and then transferred to another bottle in which the detritus had been allowed to settle, they thrived much better. This is not nearly so often seen in the case of culicine larvæ which survive very rough treatment. My explanation is this: that whereas the body bristles of culicine larvæ are simple, those of all anophelines are setose, and thus have a tendency to become clogged up with fine suspended particles. This greatly hampers the creature's movements. This clogging up can be observed with a hand lens and also the apparently purposive movements of the larvæ to cleanse themselves of the obstruction. These movements are particularly active in *kochi*, which lives in a muddy atmosphere and is usually able to free itself, while in other larvæ the bristles become more and more clogged, the preening movements become more sluggish and then they give up the unequal struggle and die.

This has a bearing on the seasonal breeding of *A. sinensis*. The larvæ are seldom to be found in the rice fields in the summer because of the custom of the Chinese of stirring up the mud by walking up and down between the rows of growing rice at periodical intervals, obviously with some definite agricultural purpose. This leaves the rice fields in a turbid condition during these months, but when the rice is full grown and the crop has been gathered, the water is left clear and undisturbed. It is then that the larvæ are to be found in great numbers.

Supposing the last disturbance to occur in September, the larvæ are free to hatch out from November onwards. Hence the abundant winter breeding. There is also a spring swarm in May, which is bred by the first flooding of the paddy fields, when the water is left undisturbed for several weeks until the rice plants are well grown.

It is in neglected or ill cultivated rice fields that the larvæ will be found in great abundance throughout the warm months.

In Java, where methods of cultivation are greatly superior to the slovenly methods of the Chinese and the fields are kept in perfect order, crop succeeding crop without a fallow interval, one will search the rice fields in vain for anophelines, but in the few ill kept fields you will certainly find them. It would therefore appear that the difficult problem of anopheline breeding in rice fields might be solved by the application of efficient methods of cultivation.

A. sinensis is found in the greatest numbers in the Delta during January and February, the coldest months of the year, and those with the least sunshine and at the same time the least rain. These, as mentioned above,

are the mature insects of the autumn breeding and they [illegible] for two to three months. During February, very young larvæ [illegible] will be found in large numbers in any small collections of water [illegible] left in the dried up paddy fields. Experimentally these [illegible] always die even when placed under optimum conditions of temperature as in the ship's galley or other warm place. But it seems probable that in nature they remain quiescent during March and April and develop rapidly in the first warm weather in May and give rise to the spring swarm. As regards the survival of eggs or larvæ in dried-up pools during the winter this seems improbable as I kept under observation several pools which had been prolific during the previous spring but were dry in the winter. After they became filled with water again in the spring rains larvæ did not reappear in them for several weeks and so were probably the offspring of newly-deposited eggs. Larvæ were observed to survive complete desiccation in dried mud for thirty-six hours but not exceeding this period. Other larvæ will not survive an hour's desiccation which goes to show that anopheline larvæ are somewhat less purely aquatic than the culicine.

The greater dependence of anopheline larvæ upon air than that of [illegible] is markedly shown by the shorter time in which they remain under water after having been disturbed, by their habit of being surface feeders, and by their preference for clear gently running water which would be [illegible] oxygenated than stagnant or foul water. This phenomenon is probably intimately associated with the absence of a long breathing tube in anopheline larvæ. For the same reason, oiling is more fatal to anophelines than to culicines. For instance the larvæ of *Armigeres obturbans* will resist the effects of oiling in a most remarkable manner, particularly if [illegible] heavy oil is used as it does not spread evenly, but leaves small spaces through which they can come up to breathe—like seals through holes in [illegible]. Another example of the "air hunger" of anophelines is the fact that they will be found in the merest film of water on the ground surface, and when found in small pools, when alarmed they will make for the shore and even wriggle up into the damp mud instead of making for deep water as do all other larvæ.

The foregoing seems to suggest that the anopheline is undergoing a biological evolution from a purely aquatic existence to an amphibious one similar to that of the common mud-hopping fish of Malaya. The latter moves with great agility out of water and can even be seen perched on the lower branches of mangrove trees.

Natural Enemies of Mosquito Larvæ found in the Canton Delta

Frogs.—Experimentally all those tried failed, and so did their tadpoles. At the same time it must be admitted that where tadpoles are numerous larvæ usually are not.

Fish. The ordinary gold-fish will eat larvæ but is a very lazy and

[illegible] The [illegible] of any kind [illegible] the [illegible] evidently [illegible] fresh [illegible] but of similar [illegible] It [illegible] unusually intelligent When kept in captivity [illegible] recognise by sight larvae held in a pipette against the glass side of the aquarium and would make energetic attempts to get at them and it soon learnt to recognise "feeding time" when the pipette was tinkled against the rim of the jar It will feed on the surface as well as below which makes it valuable in the destruction of anophelines and what is very important it is very hardy and will thrive in any kind of water even the muddiest I found it in great numbers in a buffalo wallow which was very foul and in the drain of pools amongst the dried paddy fields It is however doubtful if it would survive in a consistently tropical climate but it would be invaluable in ponds dams, reservoirs &c

Shrimps Prawns etc—Not found of any value experimentally

Aquatic Insects—(1) Hemiptera The best of these was found to be *Sphaerodema rustica* of the order of Rhynchota or bugs It is about half an inch long and resembles an ordinary land bug except for its conspicuous "paddles" or swimming legs and is of a dull grey colour It is very numerous in South China and is most voracious of larvae and appears to be harmless It would be easy to breed for the purpose of stocking ponds &c for the reason that the male can frequently be caught bearing on his back a mass of eggs which shortly hatch out into young closely resembling the adult as it has an incomplete metamorphosis It is also found in Java and Malaya but is not numerous Belonging to the same order are the pond-skaters (Hydrometridae) These are no use in attacking larvae as they live only on the surface but they destroy the mosquitoes as they are newly hatched and resting on the pupa case

The water scorpion Nepa having a leaf-like form and the fore legs modified into great pincer-like appendages and Ranatra having the same pincers but a slender body like a stick-insect will eat larvae but are too slow to be of much use

The water boatmen Corixidae and Notonectidae are very excellent and active larvicides One small specimen of a species very common in China was observed to eat eighteen larvae in twelve hours when like Henry II he "died of a surfeit" These are particularly suitable for such collections of water as gardeners tubs and can be depended upon to keep them clear of larvae There is one species whose favourite habitat is in small clear pools in hill water courses in fact in just such situations as are preferred by *A maculatus* This species might be of considerable use in dealing with the difficult problem of these hill watercourses where oiling and draining are equally out of the question

(2) *Water Beetles*—Dytiscidae the larger and Haliplidae the smaller These are all useful as are their larvae The adult Dytiscus however a large water-beetle sometimes 1" in long of a uniform shiny black colour is

not to [illegible] [illegible]uraged He is the Bolshevik of the ponds and destroys everything that comes in his way He will eat all the more useful inhabitants [illegible] and has even been seen to kill and slowly devour a gold [illegible] times his size In general water beetles and their larvæ are [illegible] to mosquito larvicides as compared with other aquatic insects M[illegible] Coleoptera have a reputation as agricultural pests prob[illegible] other insects The aquatic Hemiptera seem much [illegible] their watery world and take trial flights abroad than do [illegible] and therefore, are less likely to have destructive [illegible]

[illegible] *Dragon-flies May flies, &c* The larvæ of the smaller [illegible] are active and useful but those of the larger [illegible] are of very little use and those of may flies [illegible]

[illegible] *Spiders*—These work in the same way as pond-skaters but [illegible]

[illegible] *Plants* Though in some cases these may hinder the [illegible] to larvæ if they cover the surface sufficiently closely [illegible] help rather than hinder the breeding The large floating [illegible] provide a welcome shade for pupæ and the hanging roots and tendrils [illegible] against larvæ eating fish, &c Even the tangled, green [illegible] which might be expected to act as a trap are a favourite [illegible] for many larvæ

OTHER INSECTS, &c OF MEDICAL INTEREST

[illegible]—Cyclops is prevalent everywhere both in ponds and in [illegible] but guinea-worm appears to be unknown

[illegible] of Cyclops therefore is probably not among the four which [illegible] hosts of this disease *Dibothriocephalus latus*, however [illegible] uncommon amongst Europeans so it seems probable that the species [illegible] Cyclops is *[illegible] strenuus*

The Potamon crab (having one claw about twice the size of the other) [illegible] common in the mud of the river bank and in paddy fields, but Paragonimus [illegible] does not seem to be found in the natives though the allied [illegible] of clonorchiasis is common

[illegible] *Arachnida*—Scorpions and centipedes are sometimes found in ships [illegible] brought on board in coal sacks Of spiders the only one of interest is one belonging to the Solifugæ popularly known as the "jumping spider" on account of its remarkable agility and to the observant sailor as the "piss spider" on account of its habit of ejecting a relatively large quantity of clear fluid from its posterior end when alarmed It is usually less than a quarter of an inch in length has very prominent chelicerae a large thorax and small pointed abdomen ; the colouring is yellowish-white with black markings It is commonly supposed to be the cause of a herpetiform eruption often seen in the hot weather, which is

popularly called "spider bite" It appears to be found only in the Delta; I did not hear of its occurrence at Hong Kong or in other parts of China It is supposed to cause the lesion by running over the exposed parts of persons asleep and ejecting the blistering fluid The irregular linear distribution of the lesions lends colour to this idea and they are only found on exposed parts of the body in the majority of cases on the face and neck From the initial lesion the eruption is readily spread by scratching and sometimes forms areas covering several square inches The resulting inflammation may be very severe and lead to enlargements of the lymph glands serving the area A number of experiments were tried by allowing the insect, enclosed in a glass phial to run over the skin and it was observed to emit the clear fluid which was rubbed into the skin with a match stick, but the lesions were never produced in this manner It is therefore doubtful if the insect has anything to do with the condition On the other hand, it is possible that the virus is only effective when introduced under the dermis by minute punctures made by the claws of the feet It is possible that this eruption may be caused by another insect a small red and black beetle belonging to the Staphylinidæ which has very short elytra on a large slender abdomen so that it resembles a large red ant It is semi-aquatic and is found on the surface of ponds but is able to fly and is sometimes seen in ships It very closely resembles *Paederus amazonicus*, which is the cause of a similar eruption in South America Experiments with this creature were also negative But experiments *in vitro* are seldom conclusive—especially when they are negative

(3) *Rhyncota* —There is a very small green bug belonging to the Reduvidæ, which is found in great numbers flying on board during the summer It bites and produces a minute white weal about the size of a pin's head, which is transient but irritating A larger member of the same family also produces a slight itching but leaves no mark The giant water bug (Belostoma) is also found It is about four inches long and a most formidable-looking insect It is said to produce a very painful bite but I did not see any cases

(4) *Diptera* —The ordinary blow flies found are Lucilia of a bright blue and green colour Pycnosoma, of a metallic copper sheen, and Sarcophaga striped grey-and-white All these are very numerous Tabanidæ of three species Not very numerous and do not attack men Hippobosca a flattened fly resembling a tick, except for its long wings, is found attached to the hair of dogs and sucks blood It does not attack man Asilidæ robber flies are numerous on sandy patches of ground and attack other flies Simulium, a very minute biting fly is found usually near the sea coast, though I caught one specimen as far up the river as Sam-shui It is usually styled a "sandfly" but is quite different from the true sandfly (Phlebotomus) which does not seem to exist in these parts Hence the absence of "sandfly fever"

In September 1926, there was, in Hong Kong and Shameen a dubious

[illegible] epidemic [illegible] was diagnosed as "influenza," "dengue," and by some "sandfly fever"—the latter because many cases showed a distinct three-day form and failed to produce any rash. Moreover [illegible] sandflies were [illegible] at Hong Kong at the time. Of a number of [illegible] of patients by the late Surgeon Lieutenant-[illegible] (at that time M.O. of the dockyard) all proved to be [illegible]. In [illegible] at any rate the epidemic later produced many [illegible]. So that the probability is that all these cases were [illegible] part of the epidemic showed itself in an [illegible]. On the other hand there exists on the island of Lan-Tin [illegible] a fever locally known as "Lan-Tin fever," [illegible] a fairly clear description given by a cautious officer [illegible] a stronger resemblance to sandfly fever than anything [illegible] abundant on Lan-Tin; perhaps [illegible] may carry the [illegible] Phlebotomus.

Clinical and Practical Notes.

[illegible] TREATMENT OF VARICOSE VEINS BY INJECTION.

[illegible] C. McA. HOLMES, D.S.O., M.B., F.R.C.S.Edin., R.N.

[illegible] the past six months many articles have appeared in the various [illegible] the advantages and theoretical disadvantages of the injection [illegible] varicose veins. I decided to give this method a trial and over [illegible] have been treated in this way since August 12, 1927, in the [illegible] I can now recommend it without hesitation as [illegible] the claims brought forward by its originators. The solution [illegible] is cheap and easy to prepare. The technique requiring [illegible] the results are eminently successful without any dangerous complications [illegible] only one of my cases requiring additional operative [illegible]. This patient developed a large organized thrombus on inner side of [illegible] which doubtless would have disappeared in time, but to expedite matters [illegible] under a short anaesthesia. In all the other cases the veins disappeared without any of the untoward happenings hinted at by correspondents [illegible] medical journals.

I consider the process to be one which can easily be performed in a ship, [illegible] the great advantage that the patient could carry on with his full duty, [illegible] least with light duty, during the whole period he is under treatment. Again [illegible] ratings [illegible] up their varicose veins to produce on those occasions when [illegible] drafted to some billet which does not happen to be to their liking. It is [illegible] how the injection method would help to prevent this practice.

[illegible] the benefit of my colleagues in the naval medical service who might like [illegible] treatment, I shall give a short summary of the procedure adopted in [illegible].

The solution used and the technique employed, with very slight modifications, [illegible] recommended by A. H. Douthwaite, in his book recently published "The Injection Treatment of Varicose Veins." The solution consists of: Quinine [illegible] hydrochloride [illegible] urethane 2 grm., distilled water 30 c.c.

The patient sits on a chair placed on the top of the operating table. In this

[illegible] occasions become suffic [illegible] [illegible] made [illegible] [illegible] not, the [illegible] applied [illegible] [illegible] short time which [illegible] [illegible] to the [illegible] which has been previously [illegible] [illegible] in the position [illegible] the skin over the affected area [illegible] other and the needle [illegible] not quite filled with solution [illegible] into the lowermost [illegible] vein (The syringe [illegible] one with the peripheral [illegible] needle similar to the type used [illegible] station of N A B) The [illegible] two slightly and blood [illegible] to flow into the barrel before [illegible] the fluid is introduced ½ c c to [illegible] then injected according to the size of the vein and the needle is left in position for thirty seconds before withdrawal A gauze swab is then pressed [illegible] the puncture and the process is repeated two inches further up It is advisable to inject not more than 1 c c on the first occasion in view of the mark [illegible] for quinine possessed by some people In the absence of untoward symptoms developing 2 c.c. to 3 c c may be used at subsequent sittings Five to seven days interval should be allowed between the sittings When the total number of injections for one sitting have been given the leg is raised, cleaned up again with ether gauze applied round the leg and bandaged from the toes to above the site of the highest puncture. Three to five sittings have made extremely extensive veins disappear My colleague Surgeon Commander Braithwaite, has kindly given me the following note of a case he treated by this method —

A B aged 57 H M Dockyard Devonport Admitted to hospital September 1, 1927 with a very extensive varicose ulcer involving lower fourth of left leg, large varicosities to leg above ulcer

Sept 2 Injection of quinine and urethane 3 c c into varicose veins

Sept 14 Ulcer healed.

Sept 22 Discharged to duty cured

It has given very satisfactory results in the treatment of haemorrhoids When employed for this purpose the rectum should be cleared by means of an enema and the haemorrhoids exposed by means of a suitable speculum The fluid is then introduced through a long fine needle into the submucous tissue at the base of the pile 3 to 4 c c are used at each operation

Dr Douthwaite does not recommend the method in the treatment of varicocoeles he thinks the reaction would be too severe for such lax tissue with its surrounding important structures

In conclusion let me express the wish that my naval medical friends may be stimulated by this short paper to try this method for exterminating this malady, associated with such aching fatigue and loss of efficiency I feel confident if once they do that they will be well satisfied with the results

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A CASE OF LYMPHOSARCOMA OF THE MEDIASTINUM

By Surgeon Commander H I Briggs M B F R C S Edin R N

A Y aged 19 A B was admitted to the R N H Haslar on November 27, 1927 with a history of breathlessness and dry cough of three days duration He stated that ten days previously he had caught a "cold" then developed a cough and became breathless He carried out his full duty, but eventually had to give in on account of his difficulty in breathing No previous illness of any note prior to or since entry into the service Family history irrelevant

Condition on Admission —Well-nourished healthy looking adult Slightly cyanosed and dyspnoeic Respirations 36 pulse 100 temperature subnormal The whole of the right chest front and back was dull on percussion, more markedly so posteriorly over the middle and lower lobes Breath sounds were audible, but distant, over the latter areas and nearly absent at the base

[illegible] breathing could be heard high up in the axilla, and at [illegible] amp[illegible] A few moist sounds were heard in the axilla and [illegible] res[illegible] was diminished over the lower and middle lobes [illegible] ed in the [illegible] and apex The left lung was resonant except [illegible] at the bas[illegible] less breath sounds and no accompaniments [illegible] was in the [illegible] space at the nipple line, but difficult to locate, and [illegible] Action [illegible] and no murmurs General inspection of the [illegible] that the right lung except at the apex, was not expanding [illegible] d [illegible] axilla or abdomen No venous engorgement [illegible] the costal margin Urine normal

[illegible] —Paracentesis in the eighth space in the line of [illegible] the right scapula resulted in the withdrawal of a syringeful [illegible] microscopically found to consist entirely of cells all of which [illegible] fluid sterile on culture On introducing a medium sized [illegible] the site of the previous puncture, no further fluid was obtained [illegible] the presence of a large effusion which the physical signs [illegible] Blood count Total 7 800 polymorphs 55 per cent., [illegible] per cent. mononuclears 3 per cent, eosinophiles 1 per cent [illegible] opacity is visible in the superior mediastinum showing [illegible] rounded appearance to left of mediastinum Heart [illegible] to the right Right lung shows opacity in the lower [illegible] The lungs themselves show no abnormality Sputum [illegible] Negative to T B on at least six occasions The pat[illegible] his death taking place on February 24, 1928 Dysp[illegible] in varying degrees, increasing towards the end [illegible] but latterly not so On seven different [illegible] of fluid were withdrawn, the site chosen being the [illegible] posterior axillary line The fluid obtained was [illegible] blood tinged, from a slight to a deep colour Sterile to cult[illegible] Microscopically consisted of cells all lymphocytes At no tim[illegible] engorgement, or could enlarged glands be palpated anywh[illegible] last three weeks of his illness he complained of severe [illegible] interspaces over the base of the left lung and there [illegible] pleural effusion here.

[illegible] frequent paracenteses and x ray in therapeutic doses [illegible] on December 11 1927, and repeated at various [illegible] A tube with 8 in spark gap 1 ma 3 cm [illegible] varying from five to fifteen minutes Slight reaction [illegible] by a slight rise of temperature the same evening The [illegible] appeared to be lessened by this during the early exposures. But [illegible] unexplained [illegible] latterly they appeared to precipitate a pleural [illegible] with exaggeration of dyspnœa necessitating tapping the same evening [illegible] treatment was abandoned during the last three weeks, on account of this [illegible]

[illegible] findings.—Body fairly well nourished No dilatation of superficial [illegible] of the chest wall No abnormal degree of cyanosis. On opening [illegible] thorax the parietal pleura was seen to be invaded with new growth The [illegible] pleural cavity contained fluid in the lower part the upper part, including the [illegible] being obliterated by the tumour On cutting into the growth, a small [illegible] collapsed lung was discovered The growth was firmly adherent to the chest wall and to the vertebral column The left pleural cavity also contained a moderate quantity of clear yellow fluid The left lung was collapsed Growth was found [illegible] the parietal pleura The mediastinal cavities were solid with new growth the pericardium being completely hidden On cutting into the tumour the parietal pericardium was found to be extensively infiltrated, and the heart completely surrounded by growth The heart itself was small and atrophic, and

[illegible] with [illegible] The [illegible] by a [illegible] option but there [illegible] The [illegible] as a solid mass of [illegible] the liver was [illegible] enlarged Pa[illegible] glands were [illegible] growth Spleen small [illegible] kidney [illegible] showed one or two small [illegible] on the [illegible] The neoplasm was whitish [illegible] very vascular and showed [illegible] of [illegible] enormous masses of growth [illegible] to [illegible] origin, but it most probably [illegible] of a lymphosarcoma This [illegible] especially from [illegible] intrathoracic growth nodules in the [illegible] kidney The [illegible] case being identical

Commentary —The diagnosis [illegible] the clinical condition of the patient [illegible] x-ray findings [illegible] its nature was arrived at by a [illegible] Wassermann [illegible] any tubercular involvement of the lungs [illegible] x-ray [illegible] tubercle The normal blood [illegible] temperature [illegible] the cell character of the pleural fluid and the fact that it [illegible] culture negatived an inflammatory condition [illegible] glands alone was possible, but thought improbable Taking the age of the patient, and all the other clinical and laboratory facts into [illegible] the diagnosis of lymphosarcoma of the mediastinal glands [illegible] the most likely and eventually proved correct It is difficult to understand how a large mass of growth extending from the chest wall in front to the vertebral column behind involving the heart great vessels and roots of the lungs was not associated with more pressure signs, particularly in regard to the veins The patient [illegible] so long a time as he did is astonishing in view of the state of things found in his chest post mortem

A CASE OF CUTANEOUS ANTHRAX

By Surgeon Commander [illegible] HITCH[illegible]

The case of malignant pustule here described presents no unusual features but, as the disease is not commonly encountered in the Navy, it is thought worthy of record

J G L— aged 19 was admitted to the R N H Haslar on January [illegible] 1938, as a case of cellulitis of the neck On January 20 he noticed a small painful pimple on the right side of his neck [illegible] below the tip of the mastoid process, with some surrounding swelling He did not feel at all ill and [illegible] report sick During the night the pain and swelling increased and next morning he presented himself at the sick bay feeling rather ill his temperature being 100° F and his pulse rate 90 On admission to hospital at 10 30 a m [illegible] had the appearance of a small carbuncle and was treated [illegible] hours later a central black slough surrounded by a ring of vesicles made its appearance Encircling this was a very painful and tender [illegible] oedema with enlarged and painful glands in the occipital region and in the [illegible] triangle of the neck A clinical diagnosis of malignant pustule [illegible] excision and cauterisation of the base of the wound was performed the [illegible] of tissue removed being about 1 [illegible] in diameter The wound [illegible] Slavo's serum was given subcutaneously There was some discharge from the wound for a few days but no other untoward symptoms, and the patient [illegible] discharged to duty February 27

The diagnosis was confirmed bacteriologically by the discovery of *Bacillus*

anth[illegible] a pure [illegible] organism [illegible] obtained [illegible] taken [illegible] culture [illegible] thirty [illegible] post mortem appea[illegible] large oedematous gelatinous [illegible] inoculation and [illegible] of the spleen and other [illegible] capillaries of which [illegible] enormous numbers of the bac[illegible]

The [illegible] not discovered [illegible] was on leave at [illegible] there but was not [illegible] of a good make and had been in use for [illegible] handled any animals or hides nor worn any furs [illegible] hair brushes which he obtained at Christmas [illegible] with negative results With regard to the treatment [illegible] adopted in this case, excision and cauterization [illegible] of experience on the grounds that this pro[illegible] which heals slowly and leaves an unsightly [illegible] opening up by the incision fresh areas of tissue [illegible] may take place They prefer to rely solely on [illegible] which they claim produce in early cases [illegible] drying up of the pustule and its disappearance without [illegible] doubt has been thrown on the specificity of Sclavo's serum [illegible] of wide experience in America and the Argentine have come to [illegible] normal ox serum is equally effective For example, Krauss [illegible] of fifty cases treated in this way with no deaths, and a second [illegible] cases with only one death, i e, only 0 68 per cent mortality [illegible] cases of cutaneous anthrax treated with simple bovine serum In this [illegible] be remembered that in man anthrax is not as a rule a bacteriaemia [illegible] results from a toxic process of which the actual pathology and mode of [illegible] still obscure

Other methods of treatment which have been advocated include intravenous therapy [illegible] such as the perchloride of mercury and the arsenicals of the [illegible] benzol group, and the local treatment of the inoculation lesion by the injection of antiseptics in and around it These forms of treatment however do not seem to be justified by results

A CASE OF ACUTE INTESTINAL OBSTRUCTION CAUSED BY A BAND FROM MECKEL'S DIVERTICULUM

By Surgeon Commander H M WHELAN R N

[illegible] signalman, was admitted to H M H S *Maine* on March 17, 1928 with the following history —

He first reported sick to his ship on March 12 complaining of abdominal pain which started the previous day He vomited twelve times during the night, bowels not opened for forty eight hours No previous history of abdominal trouble The pain was intermittent and of a griping character Temperature 97 6 [illegible] pulse 66 The abdomen was soft no distension was present and there was slight tenderness in both iliac fossæ He was given an enema with slight result He vomited frequently during the day but vomiting ceased after the administration of sod bicarb and calomel gr iii

March 13 Bowels not opened after calomel Felt well in forenoon but started vomiting again p m, enema given with good result cascara given

March 14 Natural motion of bowels and good result from enema

March 15 Pain and vomiting again started p m, enema given with constipated result later an enema produced flatus only

[1] *Wien klin Wochenschr* 1917 *Vol* [illegible] 1933

March 16. Symptoms continued and distension increasing; rectal examination negative; enema returned ... is only passed *per rectum*.

March 17. Vomited ... during night of 16th to 17th. Bowels not opened, no flatus passed, abdomen much distended. Sent to II M H S Malta ... a.m.

On Admission.—Temperature 99.4° F., pulse 76, respirations 20. Patient looked somewhat anxious but otherwise fit. Tongue coated, but moist. His abdomen was somewhat distended but no signs of rigidity or visible peristalsis. There was definite tenderness in right iliac fossa extending upwards to the umbilicus. The bladder was empty and both inguinal canals were clear; tympanitic note over whole abdomen. Liver dulness slightly diminished. He vomited twice after arrival and after observation for three hours a diagnosis of acute abdomen was made and operation decided upon.

A laparotomy was performed that afternoon. On opening the abdomen a condition of acute intestinal obstruction was found and this was rapidly traced to a band of adhesions springing from the tip of a Meckel's diverticulum, which had become attached to the mesentery behind. The circle of pressure on the gut was gangrenous and a resection was decided upon. The resected portion of the gut included the diverticulum itself and the gangrenous band. A lateral anastomosis was performed and the abdomen closed.

The patient stood the operation very well and the following day was much better. Vomiting had ceased, abdomen was less distended, his general condition was much improved, and he passed a small quantity of flatus *per rectum*. No faecal matter however was returned with an enema which was given. During March 17, his condition was good. He was passing flatus freely *per rectum*, but vomiting had not entirely ceased and on one occasion it had a faecal odour.

During the night of 19th to 20th, he slept five hours. He passed flatus freely *per rectum* but vomiting persisted and he developed hiccough which was very troublesome. This was partially controlled by sucking a lump of sugar occasionally. Up to 6 p.m. on the 20th he only vomited twice and there was a ... of faecal odour.

His hiccough continued and his general condition was fair.

On March 21, he remained unchanged. He continued to pass flatus in large quantities *per rectum* and at midnight definitely passed faeces *per rectum* after mag. sulph. dr. j had been given hourly up to 1 oz.

On the morning of March 22 he was much weaker. Sleep had been interrupted by hiccough and vomiting. He was vomiting large quantities of fluid without faecal odour. In the afternoon of the 22nd, the Michel's clips were removed and the abdominal wound was found to be firmly healed. He rapidly got weaker during the day and was given saline and glucose *per rectum* but retained very little of it. At 8.15 p.m. he was sweating profusely and extremities felt cold.

At 10 p.m. he complained of a sudden acute pain in the abdomen. No apparent reason could be found for this as abdomen though slightly distended was not rigid and could be palpated without much pain. His general condition was very weak; saline was given with glucose *per rectum* and morphia ¼ gr. at 10 p.m. Patient quietened down and stated pain was much easier. At 5.40 a.m. he became pulseless and died at 6 a.m. on the morning of March 23.

Post-mortem Examination.—The anastomosis was found intact and adherent to the anterior abdominal wall, from which it was separated with great difficulty. The whole small intestine was found distended with gas to a greater extent above the anastomosis, but there was also gas and faecal matter below which showed that the anastomosis was patent. There was acute peritonitis throughout the abdomen and all the other abdominal viscera were normal except the stomach, the vessels of which were very congested, and the whole organ distended.

The main points of interest in this case appear to be:—

(1) The nature of the obstruction itself. The bands of adhesions springing

from the [illegible] encircling [illegible] mesentery [illegible] the intestine [illegible] another [illegible]

(2) Th[illegible] [illegible] sudden onset of symptoms. The patient [illegible] on at and [illegible] two days

(3) [illegible] the patient after six days from onset, which was considered [illegible] and anastomosis rather than simple resection [illegible]

(4) [illegible] operation, prior to the onset of acute [illegible] general weakening of his resistance [illegible] early stages of the obstruction

All [illegible] by the anastomosis as proved by the [illegible] the gut apparently was too far [illegible] completely empty itself above the [illegible]

It [illegible] it would not have been better to have [illegible] tubes after simple resection in spite of the patient's [illegible] postponed the anastomosis to some future date

I am greatly indebted to Major [illegible], R.A.M.C., Surgical Specialist, Military Hospital, [illegible], for his valuable advice and assistance during the operation

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A CASE OF TUBERCULOSIS OF THE TONSIL[1]

By Surgeon Commander W. H. MURRAY, R.N.

AND

By Surgeon Commander I. A. MAXWELL, F.R.C.S.(Ed.), R.N.

N. Y. Z., aged 22, was admitted to R.N.H., Haslar, on May 30, 1927

Previous History.—Nine weeks prior to admission patient noticed a cervical swelling in right side of neck, and pain on swallowing on right side of throat. Otherwise quite well. He had been treated for six weeks with ordinary gargles, &c., without improvement. No history of venereal disease

Condition on Admission.—Right tonsil enlarged and spotted with yellow patches anteriorly was an ulcer of the tonsil extending on to the anterior pillar of the fauces. Right cervical adenitis present. Appearance at this stage is best described by saying that it was diagnosed as and examined with interest by several medical officers as a typical chancre of the tonsil. Patient was transferred to the venereal section without any hesitation. Investigation, however, disproved this theory, as on six occasions the laboratory report was: Wassermann reaction negative, Sigma units nil. No spirochætes found in scrapings. He also failed to respond to N.A.B. and mist. potass. iodide. In these circumstances, the patient's general health being excellent, it was decided to excise the tonsil, leaving the diagnosis between epithelioma (improbable at his age) and tuberculosis, which we had not met in this form, to be decided by microscopic examination

On July 8 operation was performed under a general anæsthetic, both tonsils being removed by dissection. The right tonsil was superficially indurated and ulcerated; the condition involved both anterior and posterior faucial pillars and encroached slightly on the base of the tongue. The deep surface of the tonsil was quite clean and stripped normally. There was nothing unusual about the left tonsil. Removal of the tonsil left a slightly ulcerated area still on anterior

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pillar of the fauces [illegible] seemed unc[illegible] pending the laboratory rep[illegible]

Laboratory Rep[illegible] through the tissue[illegible] increase of fibrous tissue acute septic [illegible] towards the surface and in the deeper parts very numerous giant celled [illegible] which have the characteristic[illegible] those of a chronic infective granuloma rather than those of a tubercular infection. No evidence of neoplasm.

Although recovery was slower than in an ordinary tonsillectomy, the throat healed in about one month and he was discharged from hospital with only slight enlargement of the tonsillar glands which was subsiding. Patient was discharged from hospital August 5 1927.

He was readmitted August 29 1927 with a recurrence of ulceration on the right side of the tongue and lower part of the right anterior faucial pillar. There was no extension on to the soft palate or recurrence in the tonsillar fossa but the glands on both sides of the neck were enlarged. General health was still excellent. The condition again strongly suggested syphilitic infection and patient was given a further course of N A B and potassium iodide. Further examination of the scrapings revealed no spirochaetes and examination for the mycelium of actinomycosis was also negative. Hoarseness now developed, the vocal cords being congested but not ulcerated, and the arytenoids oedematous. This strongly indicated a tuberculous infection but clinical examination of the chest revealed no evidence of any pulmonary tuberculosis and the abdomen appeared normal.

X ray examination of the chest however, revealed the following condition: "Diaphragm movements free and equal; left lung fibrosis and infiltration of upper middle zones and apex; right lung fibrosis and infiltration of apex and all zones most marked in upper and middle zones. Thickened interlobar pleura."

He now began to lose weight and his temperature became definitely hectic in character, the laryngeal condition advanced and ulceration occurred and although the pharyngeal condition progressed little he began rapidly to go downhill. A further microscopic section was prepared and tubercle bacilli were demonstrated by staining. The lung condition became manifest, the temperature ranging higher and patient died of generalized tuberculosis with a terminal meningitis on October 25 after an illness extending over six months.

Post mortem Findings.—Lungs. Both lungs firmly adherent at the apices which were in a condition of chronic fibrous tuberculosis with many calcareous nodules. Small more recent cavity found in the right apex. The remainder of the lungs, especially the upper lobes, were thickly studded with miliary tubercles.

Brain. Some congestion of the meninges but no obvious tubercular change. At the base of the brain, especially over the pons, was a thick layer of yellow purulent lymph extending a little into the adjacent fissures. Other organs appeared normal.

Cause of Death.—(1) Pulmonary tuberculosis; (2) acute miliary tuberculosis; (3) tuberculous meningitis.

Conclusions.—The course of the case was presumably as follows: (1) latent and unrecognized pulmonary tuberculosis; (2) infection of right tonsil and later of larynx; (3) aggravation of general tuberculous condition by operation; (4) terminal miliary and meningitic tuberculosis.

In the making of the original diagnosis which appeared to lie between epithelioma, syphilis and tuberculosis, tuberculosis was rejected owing to its extreme rarity, negative pulmonary examination and (here of the importance of case) the fact that the ulcer appeared typically syphilitic and its induration, painlessness and punched out appearance was accepted by experienced observers as a typical chancre.

THE CEREBRO-SPINAL FLUID

By Surgeon [illegible] T. [illegible] R.N.

[illegible] is now recognized [illegible] useful [illegible] towards diagnosis [illegible] and progress [illegible] analyses of this fluid in diseases of the central [illegible] is carried out frequently and [illegible] of tests [illegible] various sources. All cases of [illegible] and diagnosis is facilitated in paraplegia [illegible] disease [illegible] cerebro-spinal syphilis, tabes, G.P.I., encephalitis [illegible]

In various forms [illegible] examination of the fluid is imperative followed by specific treatment [illegible] administration of suitable serum. In syphilitic [illegible] cell count, quantitative globulin and protein, Wassermann and colloidal [illegible] tests. For diagnosis of uraemia the chemical estimation of total non-protein nitrogen, sugar, urea and chlorides is of value. Certain of the tests must be done immediately, e.g., cell count, culture; others within an hour or two, e.g., for protein, sugar, chlorides and urea. The remainder may be carried out at leisure, e.g., Wassermann, colloidal gold [illegible] examination for tubercle bacilli in coagulum—the fluid being [illegible] in an ice chest.

There must be close co-operation between the ward and laboratory so that the [illegible] applicable to the case may be arranged for. Media have to be prepared for [illegible] purposes. The preparation of apparatus and reagents for colloidal gold [illegible] considerable time if the preferable original technique is followed, as the [illegible] has to be triple distilled and two clear days' notice is necessary. [illegible] long range of tests some are more applicable to certain groups of cases [illegible] that time and labour may not be lost over unnecessary investigation [illegible] know in what direction to direct one's effort, especially where only a small amount of fluid is available. Pathologists in civil practice have often told [illegible] difficulties they experience in this regard. Specimens of cerebro-spinal [illegible] sent for "complete examination and bacteriological" with only a [illegible] diagnosis to assist, or a cell count will be required upon [illegible] visibly blood stained. In naval hospitals clinical and pathological [illegible] much nearer the ideal in that the medical officer in charge of the [illegible] usually performs all the lumbar punctures.

In the majority of cases it is convenient to wheel the patient to the minor theatre where one can be sure of aseptic precautions and use an operating table of convenient height and level surface. The process is not easy to carry out in a ward with a bed which tends to sag. More facility has been obtained with the use of ethyl chloride spray as a local anaesthetic than with subcutaneous novocain, &c., as the patient appears to experience more discomfort from the initial puncture with the hypodermic needle in the latter method. Either a general anaesthetic [illegible] morphine may be necessary in irritative conditions. Lateral [illegible] is adopted. An assistant supports the patient with his knees well bent up [illegible] the abdomen and the chin flexed on the chest. [illegible] are marked with a [illegible] pencil from the iliac crests to give the position of the fourth lumbar spine and [illegible] spinous processes above and below this point can be similarly marked to indicate the middle line. The skin is cleansed for a radius of about 2 in. from where these lines would intersect. Meanwhile the operator prepares his hands, selects the third or fourth interspace and makes the puncture in the middle line with [illegible] needle. Three sterile test tubes, each etched with convenient 2 c.c., 5 c.c. and 10 c.c. marks, are used to take the fluid. The first

[1] This article [illegible] the [illegible] investigation [illegible] the cerebro-spinal fluid [illegible] R.N. Hospital [illegible] 1926-27.

small amount may contain a trace of blood and [illegible] be discarded A supply of these marked test tubes, plugged with wool [illegible] for use is kept at hand A total of 10 c c is ample for all tests, but when intrathecal administration of serum is to be carried out more fluid is allowed to escape, e g 30 c c serum is run in by gravity method straight from the ampoule with a rubber connection and spigot end to fit the Barker's needle When the lumbar puncture is completed the patient is straightened immediately the needle is withdrawn, the wound obliterated by gentle massage with an iodine swab and a dry dressing applied On return to the ward the patient is kept supine for twenty four hours with the foot of the bed raised

The fluid is examined for the following as necessary (a) clarity (b) pressure, (c) coagulum (d) bacteriological (e) cell count (differential and total) (f) qualitative globulin, albumin, glucose (g) quantitative protein glucose chlorides, non protein nitrogen, urea (h) Wassermann (i) colloidal gold (j) gum mastic

One or two simple tests can be performed at the moment of puncture, e g examination for pressure, naked-eye appearance presence of albumin (by boiling, as for urine, or allowing a drop of fluid to fall on the surface of strong acid NHO_3) Pandy test for globulin (a drop into an inch of 1/15 aqueous carbolic) presence of sugar (Fehling or Benedict test) Anaphylaxis can be foreseen by positive sugar reaction in cases undergoing serum treatment The indication is to desensitize by small intramuscular injections

Clarity—The normal clear limpid appearance of normal C S F may be altered e.g more or less turbid or even purulent in character in meningitis xanthochromia in compression of the cord blood stained in meningeal hæmorrhage In the latter case the blood does not coagulate in the tube whereas blood from puncture injury settles out with clear fluid above

Pressure—The normal pressure in lateral position about 15 c c water or 100 mm Ordinarily this is judged roughly taking as normal rate one drop per second on removal of the stylet On occasions a manometer is used A simple form can be fashioned out of about a foot of thermometer tubing bent at right angles into a short horizontal and a long vertical arm This latter is etched in 10 mm divisions A short portion of rubber tubing fitted with spigot end and stop cock connects up the horizontal arm with the butt of the Barker's needle on withdrawal of the stylet It is held level with the puncture site and the pressure is read off as rapidly as possible The patient's head should be straightened to prevent an abnormal reading through constriction Excess pressure is found in the majority of acute and subacute conditions Low pressure is associated with Froin's syndrome in cases of spinal subarachnoid block

Coagulum is noted after standing, e g in inflammatory hæmorrhagic, or compression cases

Bacteriological—For culture in cases of meningitis a drop or two of the fluid is allowed to fall direct from the Barker's needle on to warm trypsin legumen agar or blood agar plates Straight films from turbid fluid or centrifugalised deposit are stained as necessary with Gram (counterstain with dil fuchsin), Leishman (fix with methyl alcohol) carbol thionin &c Tubercle bacilli are best demonstrated in the central thread like coagulum which forms on standing

Cell Count—This is proceeded with in the laboratory at once whilst the specimen is fresh lest the cells disintegrate The quick method in use is as follows The test tube of C S F is rolled to ensure a fair sample and eight drops are run from a Pasteur pipette into a watch glass The pipette is dried two drops of the diluting fluid are then added and the pipette is again dried The ten drops are intimately mixed by drawing up and down in the pipette and a drop is then placed on the Fuchs Rosenthal slide Diluting fluid (glac acetic, 6 3 per cent aq distil 93 7 per cent methyl violet to tint q s) The leucocytes are stained sufficiently to differentiate and adventitious red blood cells are destroyed

[illegible]

[illegible] in [illegible] and external [illegible] cerebro-spinal fluid.

[illegible] lymphocytes per c.mm. [illegible] increase in syphilis [illegible] up to [illegible] per c.mm. [illegible] Any count above [illegible] is suspicious. [illegible] cells to meningitis [illegible] where lymphocytes occur in excess. [illegible] may be [illegible] syphilis [illegible] plasma cells with their characteristic [illegible] tubercle bacilli in syphilis and tuberculous meningitis. Extreme [illegible] (numbering many thousands) may be encountered in [illegible].

Globulin.—[illegible] in syphilitic infections and in meningitis [illegible] small [illegible] stood in the plasticine pad and the three [illegible] throttled pipette calibrated to 0·25 c.c. [illegible] rinsed in saline after each pipetting.

(1) [illegible] C.S.F. is slowly run on to the surface of 0·5 c.c. [illegible] a whitish ring at junction of fluids. Observe [illegible].

(2) [illegible] C.S.F. add 1·25 c.c. butyric 10 per cent. in normal saline [illegible] NaHO 4 per cent. and reboil. Positive: distinct [illegible]. Observe for half an hour.

(3) [illegible] C.S.F. to fall into [illegible] of 1:15 aqueous carbolic [illegible] cloud at zone of contact.

[illegible] colorimeter is available a full chemical analysis [illegible] by the colorimeter methods of Folin and Wu on lines [illegible] described in Beaumont and Dodd's handbook. Protein [illegible] after precipitation with cascent tungstic acid and from [illegible] nitrogen, sugar, creatinine and chlorides can be estimated.

Glucose.—If only glucose content is required use is made of a modification of the Pavy method. [illegible] amount of glucose (0·04 to 0·06 per cent.) is increased in [illegible] encephalitis lethargica and perhaps in anterior poliomyelitis [illegible] lateral sclerosis. A decrease is expected in the various forms of [illegible] the bacteria destroying the sugar by their fermentative action. It is also [illegible] be lessened in tabes and dementia præcox.

In the adaptation of the Pavy method a dilute solution of glucose, e.g. 0·05 per cent., is made up which will reduce a like volume of standard Pavy alkaline copper solution. It deteriorates on keeping, so a preliminary titration is always carried out. An accurate 5 c.c. of [illegible] solution, i.e. equivalent to 0·0025 grm. glucose, is pipetted into a hard glass [illegible] (1 [illegible] 8) rigged over a micro burner. Through the rubber bung run the nozzle of a 10 c.c. burette for the sugar solution and a right-angled glass bend with Bunsen pressure valve. When the Pavy solution is brought to the boil glucose is run in until reduction is complete, the end point being complete decolorization.

The apparatus having been washed out the process is then carried out anew with 5 c.c. Pavy + 2 c.c. C.S.F. From the difference in the titration figures the amount of glucose in 2 c.c. C.S.F. is calculated, e.g. to reduce 5 c.c. Pavy (equivalent to 0·0025 grm. glucose) requires 5·5 c.c. glucose solution, and 5 c.c. Pavy + 2 c.c. C.S.F. requires 4·5 glucose solution. Then

$$\frac{(5.5 - 4.5) \times 0.0025 \times 50}{5.5} = \text{glucose in C.S.F.} = 0.022 \text{ per cent.}$$

[illegible] —The normal [illegible] in meningeal [illegible] conditions [illegible] used in [illegible] tuberculous [illegible] is obtained by [illegible] of Heller's [illegible] two drops of nitric acid [illegible] is made [illegible] little is run into the [illegible] taken to form a distinct white [illegible] successive dilutions, 1/20, 1/30 [illegible] *two minutes* [illegible] above standard [illegible] 1/20 = 0·0033 per cent [illegible] 0·0033 [illegible] standard strength of album[illegible]

For routine purposes [illegible] opalescence with C.S.F. [illegible] comparison tubes by the method of Bavnti [illegible]

Wassermann.—For [illegible] in the ice chest until [illegible] week's tests are being [illegible] tubes is used 1 c.c. 0·8, 0·6, 0·4, 0·2 c.c. of unheated [illegible]

Colloidal Gold.—[illegible] colloidal gold test [illegible] the utmost value in [illegible] syphilis [illegible] this means even before the C.S.F. [illegible] and the typical curves of G.P.I. and tabes [illegible] Assistance is also afforded in encephalitis [illegible] meningitis [illegible] negative finding should [illegible] conditions. If the test is carried out in the [illegible] triple distilled water for the preparation of all [illegible] able time and trouble are required. The necessary [illegible] solution may not be obtained until after many trials [illegible] perfectly by giving complete precipitation with [illegible] the method of Temple Grey described by Surgeon [illegible] the JOURNAL OF THE ROYAL NAVAL MEDICAL SERVICE [illegible] water can be utilised, the essential neutrality [illegible] carb. and bicarb. in 2 per cent. solution.

The phenomenon of [illegible] whilst attempting to devise a quantitative [illegible] that the C.S.F. in G.P.I. precipitates [illegible] concentration and in other conditions it has been [illegible] upon the proportion of globulin and album[illegible] definite strengths of C.S.F. with 0·1 [illegible] is kept solely for the test. A series of [illegible] 1/10 to 1/5120 in 1 c.c. volumes is made and [illegible] The colour changes are observed after [illegible] night.

The Gum Mastic Test [illegible] test. It is easy and inexpensive [illegible] absolute alcohol for making the gum solution [illegible] obtained by completely dissolving [illegible] absolute alcohol and filtering. This keeps [illegible] solution are mixed with 18 c.c. absolute alcohol [illegible] rapidly into 80 c.c. distilled water [illegible] (1 per cent.) plus 1 c.c. (0·5 per cent.) [illegible] tubes is set out as in the preceding test [illegible] 1 c.c. volume 1 c.c. gum solution [illegible] standing overnight the reaction shows itself as a precipitation [illegible] curves are obtained in the same [illegible]

Reviews.

[illegible] Field Work and Pa[illegible] L. R. [illegible] D., LL.D. Surgeon General U.S. Navy. [illegible] H. K. Lewis and Co. [illegible] Numerous Illustrations [illegible]

Th[illegible] book is becoming something of an encyclopedia as regards the [illegible] contents, but happily not as regards size or price. It forms an excellent [illegible] for the general worker in the clinical laboratory, but it is also peculiar[illegible] to the needs of the ship's doctor, who may be called upon to diagnose [illegible] and prevent all kinds of diseases in all parts of the world. The author, [illegible] naval medical officer, has seen the requirements of his colleagues and has supplied them.

Bacteriology [illegible] with in the first 300 pages, after which follows serology, hæmatology, [illegible] including protozoa, helminths, ticks, bugs, flies, mosquitoes, and p[illegible] fish, centipedes and snakes. Then comes an account of laboratory methods of [illegible] and an appendix in which will be found some of the modern [illegible] biochemical analysis of the body fluids. In addition to instructions on general laboratory work there is a good deal of information on the pathology of [illegible] and various other points are touched upon which are even more useful to the [illegible] and hygienist than to the laboratory worker. [illegible] the Schick test, anaphylaxis is discussed, and there is a detailed account of the modern puncture methods of vaccinating for small-pox, together with an account of the various types of reaction following, which [illegible] should be much more widely known than they are. There are also outlined accounts of certain aspects of metabolism, food values, vitamin and deficiency diseases.

Altogether Stitt is much more than a laboratory handbook, and thoroughly deserves the place it has recently gained in the medical officer's library supplied to H.M. ships.

H. B. P.

The Ear, Nose and Throat in General Practice. By D. A. Crow, M.B., Ch.B.Edin., Oto-laryngologist, the Sussex County Hospital, Brighton; the Sussex Throat and Ear Hospital, &c. First Edition. London: Humphrey Milford, Oxford University Press. 1927. Pp. 1[illegible]0. [illegible] illustrations. Price 10s. 6d. net.

This small book, the first edition of which has just been published, is a welcome addition to the many works on this subject. It is essentially practical, written by one who spent ten years in general practice prior to specialising, and treats in a short space most of the conditions met with in any type of general practice. Chapters II and III are devoted to the acute ear and its sequelæ; it is distinctly good. The author strongly emphasizes the importance of an early paracentesis in acute otitis media, and clearly describes the operation; it is one of the surgical emergencies which every medical practitioner should be prepared to do. The technique of the operation for removal of tonsils by dissection is admirably described, no detail being omitted, and the author ably emphasizes the growing modern opinion in favour of the dissection method as opposed to removal by guillotine. The miscellaneous notes in Chapter IX are good, but are arranged without any method. Still, the material is there and the reader is not confounded with too many remedies.

The book is pleasant reading, and it is well illustrated, and can be strongly recommended to any practitioner who, without desiring specialist's knowledge, needs ready information on every ear, nose and throat emergency.

W. H. M.

DISEASES OF THE THROAT, NOSE AND EAR. By Dan McKenzie, M.D., F.R.C.S.E., President 1926-27 Section of Otology, Royal Society of Medicine; Surgeon, Central London Throat and Ear Hospital. Second Edition. William Heinemann Ltd., London. Price 15s. net.

The second edition of this work is welcome in view of the advances in this branch of surgery since the book was first published seven years ago, and it has been found necessary to enlarge it by nearly one third. Still the volume is not over cumbersome and it is pleasant to read, well printed and illustrated, and contains within its 654 pages pretty well all that need be written about diseases of the throat, nose and ear.

On opening the book one's attention is immediately arrested by a coloured drawing, from a picture painted in 1870, of left recurrent laryngeal nerve paralysis and atrophy of the muscles supplied by that nerve. No better frontispiece could be desired. The first chapter deals with note taking and general signs and symptoms, a short and valuable introduction. In the paragraph on physiognomy one wishes that the author had laid more stress on the open mouth, because one finds so many patients suffering from the bad habit of *mouth breathing* and its dire results, and the gospel of nose breathing cannot be reiterated too often or too loudly. Two chapters on the examination and affections of the mouth, fauces and pharynx follow. There are useful concise paragraphs on the Schick test and anaphylaxis in addition to the customary matter. The instructions for local anaesthesia for tonsillectomy are very good. The author has omitted to include chicken pox among the exanthemata that may affect the mucous membrane of these parts.

A short chapter on the examination of the larynx and laryngeal technique introduces the reader to the study of the affections of the larynx. A new instrument invented by Haslinger of Vienna, a form of bivalve speculum for direct examination of the larynx, is described and illustrated. All the necessary operations are included. These chapters are excellent. Chapter VI deals with the examination and affections of the trachea, thyroid body and oesophagus, the thyroid section being necessarily short. The author condemns oesophageal bougies, probangs and coin-catchers, though all three have been and still are used. The removal of all foreign bodies from the oesophagus by direct endoscopy is a counsel of idealistic perfection. Chapter VII concerns the examination of the nose and naso-pharynx. Nasal endoscopy, a comparatively recent application of direct illumination, is a distinct advance, and it is good to note the relegation to limbo of palpation of the naso-pharynx.

Local anaesthetization is well described. The author is fond of a preliminary injection of morphia and atropine, and of stronger solutions of cocaine than many surgeons use. Affections of the nose occupy Chapter VIII, eighty four pages, including all the ordinary operative procedures. Examination and diseases of the nasal accessory sinuses take up the next sixty three pages, illustrated by splendid drawings and radiographs. The importance of chronic sinusitis in general medicine is becoming increasingly recognized, which enhances the value of this chapter. Next comes a short chapter on the affections of the naso-pharynx, with an excellent coloured plate showing the pharyngeal orifice of the Eustachian tube illuminated by the nasal endoscope.

The ear section occupies over 200 pages, and opens with a well written chapter on examination. The author prints the scheme adopted by the Otological Section of the Royal Society of Medicine for hearing tests, in which the voice, whisper and watch test results are expressed fractionally, a good plan that is taking a long time to become universal. The otolith reactions are a new step in the elucidation of vertigo.

The heaviest course in this literary feast is provided in the next chapter, number twelve, on affections of the ear. The whole matter is thoroughly examined

[illegible] ions [illegible] ly good [illegible] prognosis. [illegible] into [illegible] and classification into regional, cisternal and [illegible] ed or wep of the [illegible] arachnoid spaces helps [illegible] The chronic catarrhs of the middle ear and [illegible] concise chapter on fourteen pages.

[illegible] and labyrinth disease. The paragraphs [illegible] ion, shell shock, syphilis, are of [illegible] A short chapter on nerve complica[illegible] the acoustic nerve includes an excellent [illegible] showing the facial nerve canal.

[illegible] of the mouth and the lymphatics of the [illegible] might be omitted in curtailment of [illegible] edition.

[illegible] commended to anyone desirous of studying [illegible] gy.

H. M. B.

[illegible] THE NOSE, THROAT AND EAR, FOR STUDENTS AND [illegible]. By W. S. Syme, M.D., F.R.F.P. & S., F.R.S.E., Lecturer on [illegible] Throat and Nose, Glasgow University; Surgeon for Diseases of the Throat and Nose, Western Infirmary, Glasgow; Surgeon [illegible] Hospital, Glasgow; Consulting Aurist and Laryngologist [illegible] Sick Children, Glasgow, etc. Second Edition. Edinburgh: [illegible] Livingstone, 19[illegible]. Pp. 400. With 26 illustrations, [illegible] photographs and 13 coloured plates. Price 12s. 6d. net.

This book has been completely revised and brought up to date. Much new [illegible] has been added, yet at the same time its size remains the same. It enables the beginner to obtain a grasp of the subject and also provides the practitioner with a ready guide in his clinical work. The conciseness and the clarity of the language employed by the author make it a suitable book to recommend to students commencing the study of diseases of the ear, nose and throat, and as a preliminary to the more exhaustive works on the subject. It contains the generally accepted teaching on the subject without the mass of detail proper in [illegible] more ambitious work of reference.

The routine method of examining the nose, accessory sinuses, naso-pharynx, larynx and ears is fully described and the auditory and vestibular tests are clearly explained. The cause, signs, symptoms and treatment of the various pathological conditions met with are clearly stated and the text is illustrated by several useful diagrams and coloured plates. The two photographs of sections on otosclerosis by Dr. Albert Gray are very interesting. An appendix of twelve pages contains several useful formulæ of medicaments used in the treatments. The more common operations, e.g., tonsillectomy, are clearly detailed. Though enucleation of tonsils by dissection is now the recognized routine, many of those accustomed to the use of the guillotine still maintain that in children at any rate they can enucleate any tonsil by *Sluder's method*. In the several pages devoted to direct examination of the upper air and food passages, the latest methods in endoscopy and the suspension apparatus and directoscope are described and illustrated. The book finishes with a chapter on x-ray examination in affections of the nose, throat and ear, and a few pages are devoted to diathermy in the treatment of malignant disease.

This book reflects great credit on the author and publishers. It is well written and easily read, and the few hours spent in its perusal are well repaid. For the student about to commence clinical work, I can recommend no better book.

A. C.

HERNIA AND HERNIOPLASTY. By LIONEL M. COWELL, D.S.O., M.D., B.S.Lond., F.R.C.S.Eng., Surgeon, Croydon General Hospital; Hunterian Professor, Royal College of Surgeons of England; Late Assistant Demonstrator of Anatomy, University College, London. With an introduction by Sir Arthur Keith, F.R.C.S., F.R.S. Pp. xvi + 1[illegible], with 72 illustrations, including 8 plates. London: H. K. Lewis and Co. Ltd. 19[illegible]. Price [illegible] net.

Statistics from both naval and civilian hospitals show that operations undertaken for the radical cure of hernia are extremely common. Recurrences or in plain language failures, occur in proportions varying from [illegible] to [illegible] per cent. It is high time that this percentage of failures should be materially reduced, especially when we realise that many recurrences are due to faulty methods of operating. Mr Cowell, in the book under review, has given us sound and ingenious method of obtaining such a desirable result, especially in the more difficult cases. Autoplastic transplants may require a higher standard of surgical technique than that employed in the relatively simple [illegible] type of operation, but that should offer no valid reason for not [illegible] them.

In the opening chapter a brief historical review of the periods of herniotomy, herniorrhaphy and hernioplasty demonstrates very well the evolution of a modern operation. We agree with the author that "it is to hernioplasty we must look for successful results in the future." But surely Kocher deserves to be honourably mentioned in the period of herniorrhaphy. His method of invaginating the sac and gathering up the slack peritoneum was an attempt to carry out a point of technique on the importance of which Mr Cowell very rightly insists in the later chapters. After [illegible] a topographical classification of the varieties of hernia, the surgical anatomy of the parts is set forth. Diagrams supplement the text admirably, the relation of the bladder to the hernial regions being particularly well shown.

In discussing the pathogenesis and morbid anatomy more debatable ground is reached. Many good specimens are illustrated in support of the author's views. His dogmatic statement that "oblique inguinal hernia is of congenital origin" will not be accepted by all. What constitutes a "potential" sac is not easily defined. "Tot homines, quot sententiae" may be applied with particular force here. In our opinion other factors than the anatomical and pathological findings will receive more consideration in the future. The happy term of a "pilot lipoma" in a femoral hernia may well be exercised in many cases of the oblique inguinal variety where its origin is not so patent. Recent work on fascial grafts and sutures is reviewed and many important statistics are quoted. In spite of this evidence that muscle will not unite with fascia, we should not lose sight of the fact that many permanent cures have been obtained in the past by other methods than hernioplasty. Recurrences not infrequently occur when the conjoined tendon is found at operation to be firmly attached to Poupart, and the true reason of the failure can be traced to other causes which are discussed in a subsequent chapter.

An accurate and full account of the author's flap operation is given wherein the main principle is fulfilled by taking a graft from the external oblique to provide a new posterior wall to the inguinal canal. Preliminary preparation of the skin by the "bath, shave and methylated spirit" have proved both simple and expedient. The steps of the operation can be readily followed, but the photographs, figs. [illegible] and [illegible], hardly represent the details required to supplement the text. We should have preferred drawings here in order to show the manner of utilizing the grafts. The causes of recurrence and faulty methods of operating receive adequate attention. Reference is also made to filigrees, which are justly subjected to adverse criticism supported by radiographic evidence. Appendices showing hernia in relation to the Workmen's Compensation Act, Life Assurance and the Services, together with brief reports and an analysis of the first 180 flap operations, complete the volume.

[illegible] the book as [illegible] of [illegible] the attempt to [illegible] here [illegible] hospitally practised. Not only [illegible] terms well [illegible] original method of [illegible] step forward in the surgical treatment [illegible] fatality.

H. E. R. S.

The Science and Practice of Surgery. By W. H. C. Romanis, M.A., M.B., M.Ch.Cantab., F.R.C.S. [illegible] Surgeon in Charge of Out-patients and Teacher of [illegible] St. Thomas's Hospital; Surgeon to the City of London Hospital for Diseases of the Chest; Examiner in Surgery to the University of [illegible], &c.; and Philip H. Mitchiner, M.D., M.S.Lond., F.R.C.S. [illegible] in Charge of Out-patients, Teacher of Operative Surgery and [illegible] of Anatomy, St. Thomas's Hospital; [illegible] Surgeon to the [illegible] Hospital; Lieut.-Col. R.A.M.C. (T.), Commanding Medical Units, University of London O.T.C., &c. Two volumes [illegible] 661 illustrations. London: J. and A. Churchill, 7 Great Marlborough Street. 1927. Price [illegible] net each.

Surgical textbooks by British authors are numerous. The assumption that this [illegible] field has already been over exploited is not, however, sound, for a place [illegible] be allotted to a new work which presents with convincing [illegible] the views of the modern English school.

[illegible] work is in two volumes, running to little short of 1,700 pages. In the [illegible] the authors state that their object is to provide a work of reference for the [illegible] at home, and to furnish a book which will assist the student to pass [illegible] and advanced examinations in surgery.

[illegible] does not profess to be a manual of operative surgery—indeed the [illegible] of operations are for the most part brief—but it claims a full account [illegible] pathology and of the scientific side of surgery.

[illegible] review at length. It is no easy task to convey an adequate idea of its [illegible]. It is essentially an up-to-date book, whose modernity will assuredly [illegible] itself hostile critics from the ranks of the old school. To our mind [illegible] outlook is wholly refreshing, but we can imagine conservative elders [illegible] hands in horror when they read that prior to operation (rectal cases [illegible]) no special purgation or enemata are necessary, provided the bowels [illegible] acting regularly. It is pre-eminently a readable book, since it is not verbose, [illegible] amount of information being clearly conveyed with a minimum of words. [illegible] and surgical anatomy are particularly well done, only those points [illegible] to the practical surgeon's outlook being presented.

In Volume I are to be found excellent descriptions of modern general technique [illegible] twenty-four chapters containing full and clear accounts of the subject [illegible] dealt with. The article on tetanus stands as a model of its type, but those [illegible] general [illegible] and syphilis are not ideal, even though they be judged by the standard of [illegible] articles in works on general surgery.

In the section on syphilis attention must be drawn to the following sentence which appears on p. 118. The reference is to interstitial keratitis, where [illegible] the trouble not infrequently spreads to the lens and iris, and serious trouble [illegible] result. This sentence may be described as pointedly nebulous, but it is only [illegible] to say that it is atypical of the general standard of style. On page 100 it is [illegible] that [illegible] old-standing tertiary disease with demonstrable lesions 60 per [illegible] of cases give a negative Wassermann reaction! It would be interesting to [illegible] upon what clinical evidence such an astounding statement is based.

Open operation for fractures generally is not advocated, except as a "trump card," a point of view with which we find ourselves in agreement, for the end results of such cases are, in the majority, disappointing. The operative treatment

[illegible] Ross, M.D., B.S. [illegible] M.R.C.S. [illegible] Pathologist to the Royal Free Hospital [illegible] London School of Medicine for Women; late [illegible] Mary's Hospital. With Preface by [illegible] Kettle [illegible] and Bacteriology, Welsh National School of [illegible] edition. Humphrey Milford, Oxford University [illegible] 192[illegible] Pp. [illegible] Fcp. 8vo. Price 7s. 6d.

[illegible] small volume [illegible] edition of which was published in 1925 is [illegible] to meet the [illegible] students and of those to whom the performance [illegible] is a comparatively rare occurrence. After some [illegible] technique and the preservation of specimens [illegible] appearances found in death from various physical [illegible] and from twenty one varieties of poisons. [illegible] consists of descriptions of what may be termed [illegible] comprehensive number of pathological conditions [illegible] tables of anatomical normals, dates of eruption of [illegible] of the principal bones, is provided. The book is con[illegible] and will be found a useful guide to those for whom it is [illegible]

F. G. H.

[illegible] THEM. By A. Moore Hogarth, F.E.S., Hon. Secretary [illegible] of Pestology. First Edition. London: John Bale, Sons and [illegible] 83-91 Great Titchfield Street, W.1. 1928. Pp. 46. [illegible] Price 6d.

[illegible] was the founder of the Vermin Repression Society, which soon became the College of Pestology, securing the passage through Parliament of the Rats and Mice (Destruction) Act of 1919.

As it has been estimated that rats cost the nation something like £100,000,000 per annum, the importance of this Act in endeavouring to keep down rats is very real in these post war days. The pamphlet is most interestingly written, dealing with all the methods that can be employed in the destruction of rats. Details are given re nesting, food supplies, baiting and prebaiting, the various chemical poisons, solid, liquid and gaseous, traps, dogs, cats and ferrets. The author is keen on the use of viruses under certain circumstances. But it is urged that much more central organization is required from the Ministry of Agriculture to ensure that authorities co-operate and synchronize in their efforts in rat destruction. In addition to the present rat week at the migration of rats in November, a similar week should be held in the spring.

The author is an enthusiast, and the book should be in the hands of anyone who has seen a rat on his property.

C. H. D.

Preparations, &c.

"WELLCOME" LIVER EXTRACT

BURROUGHS WELLCOME AND CO. announce the issue of "Wellcome" Liver Extract for the treatment of pernicious anæmia. This product is a light brown powder almost entirely soluble in water and represents an active selected fraction of an extract of fresh liver. "Wellcome" Liver Extract is prepared by a method tested and found efficient by the Medical Research Council after the substance had been subjected to clinical trials. It is issued in tubes, each of which contains the equivalent of half a pound of fresh liver. This amount is the minimum daily dose in the initial stages of treatment of a case of pernicious anæmia. Under treatment with this active fraction of liver extract, the red

[illegible] and rapid, [illegible] symptomatic improvement. The [illegible] doses of liver extract are given.

"Welkoma" Liver Extract [illegible] packages containing twelve tubes.

LIGHT AND HEAT IN MEDICINE, SURGERY AND PUBLIC HEALTH

Second International Conference and Exhibition

The Second International Conference on Light and Heat in Medicine, Surgery and Public Health will be held in London from October 29 to November 1, 1928.

Owing to the success of the previous Conference, which took place in December of last year, the forthcoming Conference will be held in the University of London, South Kensington, S.W.7, when it will be led and supported by an even greater number of distinguished British and foreign authorities. The subject will be discussed both from its therapeutic and scientific aspects, and it is hoped to arrange visits to representative clinics where the most modern methods of utilizing light and heat for therapeutic purposes will be seen.

Simultaneously with the Conference, an Exhibition of the most up to date apparatus and accessories for ultra-violet, radiant heat, and allied forms of therapy will be held in the Great Hall of the University, adjoining the Conference Hall. The Exhibition will be on a more extended scale than last year, owing to the greater facilities available, and will comprise interesting exhibits by learned societies and institutions.

Reduced rail fares will be obtainable in England and Scotland for those attending the Conference.

The Conference and Exhibition are again being organized by the *British Journal of Actinotherapy* (17, Featherstone Buildings, London, W.C.1), who will gladly send all available details to any medical man on request.

News of the Service

OBITUARY

We regret to announce the death of Deputy Inspector-General [illegible] Christie, R.N. (retired), which took place on [illegible] 1928. Born March 1851 [illegible] Edinburgh, taking the degrees [illegible] M.B., C.M. [illegible] R.N. [illegible] and was appointed Surgeon of H.M.S. [illegible] Staff Surgeon March 1886 [illegible] for the [illegible] He was placed on the retired list March 1898 with the honorary rank of Deputy Inspector-General. [illegible] keen interest in [illegible] matters [illegible] to the Service.

To his family we extend our deepest sympathy.

We regret [illegible] the death of Deputy Inspector-General [illegible] R.N. (retired), which occurred on April 16, 1928. Born April 18[illegible] London, taking the degrees [illegible] M.R.C.S. Eng. 1878 [illegible] R.N. [illegible]

[illegible] 1920 and [illegible] medically until [illegible]

[illegible] sympathy

ROYAL NAVAL MEDICAL CLUB

The Annual Dinner was held at the Trocadero Restaurant, on Thursday, April 26. Out of 144 acceptances 131 attended including the official guests of the Club. These were Sir John Rose Bradford, K.C.M.G., C.B., C.B.E., President of the Royal College of Physicians; Mr. H. L. Eason, C.B., C.M.G., Superintendent of Guy's Hospital; and Dr. E. W. Goodbody, Chairman of the Services Committee, The British Medical Association. Prior to the Dinner the Annual General Meeting was held. The following were elected to serve on the Committee for the ensuing year:—

Representing the Active List:—

Surgeon Captain T. B. Shaw.
Surgeon Captain C. K. Bushe, O.B.E.
Surgeon Captain (D) E. E. Fletcher, O.B.E.
Surgeon Commander F. Lewis Smith.

Representing the Retired List:—

Surgeon Rear Admiral J. Falconer Hall, C.M.G., K.H.S.
Surgeon Lieutenant W. Ibbotson.

The financial statement showed that the Club was in a satisfactory state. It was unanimously decided to place on record in the Minutes of the Club the great loss the Club and indeed the whole Service had sustained on the death of Surgeon Rear Admiral Sir Percy W. Bassett Smith, K.C.B., C.M.G., who for many years had been the Chairman of the Committee and of the Annual Meeting.

The following members of the Club were present:—

Present: President, Surgeon Vice Admiral A. Gaskell, C.B., O.B.E., Medical Director [illegible]. Guests of the Evening: Sir John Rose Bradford, K.C.M.G., C.B., C.B.E., Mr. H. L. Eason, C.B., C.M.G., Dr. E. W. Goodbody.

Members present: Surgeon Commander [illegible] Atkinson, D.S.O., A.M.; Surgeon Rear Admiral W. C. Axford, C.B.; Surgeon Lieutenant [illegible] Partington; Surgeon Commander K. Digby Bell; Surgeon Lieutenant J. [illegible] Blake; Surgeon Rear Admiral [illegible] Bond, C.B.; Surgeon Captain [illegible] Brydon; Surgeon Commander H. Briggs; Surgeon Commander [illegible] Brownfield, O.B.E.; Surgeon Captain [illegible] Burbridge, O.B.E.; Surgeon Captain C. K. Bushe, O.B.E.; Surgeon Captain J. A. Campbell, O.B.E.; Surgeon Lieutenant [illegible]; Surgeon Lieutenant C. W. Carte; Surgeon Lieutenant-Commander [illegible] Cassidi, R.N.V.R.; Surgeon Vice Admiral Sir Joseph Chambers, K.C.B., C.M.G., K.H.P.; Surgeon Captain [illegible] Cock; Surgeon Commander A. [illegible]; Surgeon Commander J. [illegible]; Surgeon Commander H. Dewar; Surgeon Lieutenant W. Donaghue; Surgeon Captain J. S. Dudding, O.B.E.; Surgeon Captain A. Fleming, D.S.O.; Surgeon Captain (D) E. E. Fletcher, O.B.E.; Surgeon Lieutenant (D) W. [illegible] Ford; Surgeon Vice Admiral A. Gaskell, C.B., O.B.E.; Surgeon Commander [illegible]; Surgeon Lieutenant [illegible] Gladstone; Surgeon Lieutenant R. L. Glass; Surgeon Commander F. J. [illegible]; Surgeon Lieutenant [illegible]; Surgeon Rear Admiral J. F. Hall, C.M.G., K.H.S.; Surgeon Captain K. W. B. Hall, O.B.E.; Surgeon Lieutenant H. M. Handsell, D.S.C.; Surgeon Lieutenant [illegible] Harkness; Surgeon [illegible] J. M. Hassen, D.S.O.; Surgeon Captain W. L. Hawkins; Surgeon Lieutenant-Commander W. [illegible] Heath; Surgeon Rear Admiral A. J. Hewitt, C.B.E.; Surgeon Rear Admiral [illegible] Hewitt, C.B., C.M.G.; Surgeon Commander W. P. Hingston, C.B.; Surgeon Commander [illegible]; Surgeon Lieutenant-Commander (D) J. S. F. Horton; Surgeon Captain R. Hughes; Surgeon Lieutenant (D) W. H. Hume, R.N.V.R.; Surgeon Captain H. Hunt; Surgeon Commander F. W. [illegible], O.B.E.; Surgeon Lieutenant-Commander S. R. Johnston; Surgeon Lieutenant-Commander W. A. Jolliffe; Surgeon Captain M. H. Knapp; Surgeon Lieutenant-Commander (D) [illegible] Lawry; Surgeon Captain A. McCloy; Surgeon Commander [illegible] McL[illegible], D.S.O.; Surgeon Captain J. McCutcheon; Surgeon Commander R. H. McMillan, [illegible]; Surgeon Lieutenant [illegible] McMillan; Surgeon Lieutenant-Commander A. W. MaR[illegible]; Surgeon Commander [illegible] MacEwan; Surgeon Rear Admiral A. Maclean, D.S.O.; Surgeon Commander M. H. Macleod; Surgeon Lieutenant H. Carey Mann, O.B.E.; Surgeon Lieutenant [illegible]; Surgeon Commander (D) H. M. Mask; Surgeon Captain [illegible] Miller; Surgeon Captain R. H. Monument, O.B.E.; Surgeon Lieutenant-Commander (D) W. C. Morton; Surgeon Captain T. W. Muir, O.B.E.; Surgeon Lieutenant

[illegible] Captain [illegible]
Surg. [illegible] Surg. [illegible]
H [illegible]
R N V R [illegible]
Surgeon [illegible]
Rusbury [illegible]
A. K. S. [illegible]
Stephen [illegible]
Sutton, C. W. [illegible]
C B L [illegible]
Commander [illegible]
Waddy, Surg. [illegible]
Lieutenant [illegible]
Whitestone [illegible]
S. Wilson [illegible] Surgeon Commander [illegible] Woodruff [illegible]

The President [illegible] Admiral A. Gaskell) proposed the "Health of the King" and [illegible] In proposing the "Health of Our Guests" the Medical Director [illegible] Gentlemen, the acoustics of this room are very bad and possibly [illegible] hear me—possibly you hope you cannot (laughter). May I ask [illegible] in this, my first speech at the Club as Medical Director [illegible] here to-night those who served in various Government Medical S[illegible] the Great War? I have attended, whenever it was possible to attend [illegible] the Club has held since its inception and I have kept the menu [illegible] of each dinner as a memento. I was showing one of these [illegible] the other day and she said, "What an ugly crowd of men [illegible] that if she could look round and see you all to-night [illegible] me of a story Sir Joseph Chamberlain—and we are delighted [illegible] coming to-night—told me the other day. It was of [illegible] the principal guest of a certain golf club near to which [illegible] plastic surgeon. The Judge said he understood that [illegible] made a great success in altering people's faces [illegible] at the members present to-night, he said "I cannot help [illegible] the idea you don't all go to the great surgeon" (laughter). I have [illegible] attentively at every dinner to the speeches made by the various M.D.G.s [illegible] one feature common to all these speeches. It is the resemblance [illegible] that of a chairman of directors at the annual meeting of a company when the chairman reports on the past year's work and the outlook for the future. I must therefore conform to precedent. Sir Joseph told you last year of the changes which had been introduced, and there is very little fresh for me to say, for as you know I only took over on July 1 last. Since then I have been steadily trying to consolidate the great things he has done for us. I have had firmly fixed ideas for years on what would improve the medical service of our splendid Navy. To prevent myself ever losing sight of these ideals or ever deviating from a steady continuity of purpose I have written these down and keep them at hand in my drawer. The M.D.G. must have help from every one of you splendid fellows, for it is the bounden duty of everyone of us to do all in our power to keep our Service at as high a level as possible. The late Joseph Chamberlain used to call upon all Britishers "to think Imperially." I ask you to think "Medical Director Generally," for in the sincerest words I am capable of speaking I beg of you all to put yourself in my place and think out each in his own honest way what is best for our branch and so for the service of our great British Navy. Our hospitals are splendid, so are our medical officers, sisters and sick berth staff and to keep up this greatness we must get the best of our profession to follow on after us, thus everyone of you can by spreading the news of our Service at your Almae Matres be potential recruiting sergeants for our medical service. We want the best type of men and none others will do for us. We have them but we want more and more! Recently I read that rather nauseating book "Mother India." [illegible] it is a phrase used by Gandhi to the Hindu

people [illegible] and the [illegible] ions [illegible] I would ask you [illegible] [illegible] that the [illegible] last [illegible] to which [illegible] person [illegible] would [illegible] [illegible] build [illegible]

Now [illegible] was [illegible] and us [illegible] (cheers) All the same [illegible] of [illegible] [illegible] We [illegible] pleased there are so [illegible] pleasure to welcome those who have [illegible] during the war (cheers) [illegible] to welcome them very warmly

[illegible] members here [illegible] Surgeon Rear Admiral Sir [illegible] Bassett Smith and Surgeon [illegible] Dreaper Sir Percy the [illegible] man with a heart of gold [illegible] George Dreaper the big and rugged friend No one [illegible] without loving him May they rest in peace

[illegible] from our old friend Sir [illegible] Porter He fully intended [illegible] he says "thanks to gout rheumatism or whatever [illegible] may be pleased to call it, I am precluded from [illegible] He trusts we shall have a very happy, cheery successful [illegible] record attendance (cheers) Our Secretary has [illegible] his good wishes and I propose to write to him to-morrow [illegible] for a speedy recovery (cheers)

[illegible] refers to the Compassionate Fund and the Journal [illegible] such a flourishing condition as I should like to [illegible] get all the members of our medical service to [illegible] should also be kindly [illegible] If the [illegible] profession [illegible] efforts to [illegible] as they [illegible] surely [illegible] Two bottles of whisky less a day [illegible] will pay more than your subscription to our [illegible] this afternoon to [illegible] our donations to those [illegible] To [illegible] £[illegible] and it is fine to think we can do this from [illegible]

[illegible] Journal, the JOURNAL OF THE ROYAL NAVAL MEDICAL SERVICE [illegible] past editors have worked hard and without any remuneration [illegible] the Journal up to its high standard They have [illegible] done all possible [illegible] and have worked like slaves It still [illegible] the balance but we must [illegible] Subscribe to it write for it read it and get others to join it The [illegible] Compassionate Fund and the Journal are the outward and physical [illegible] spirit de corps of our medical service for it is certain that without esprit [illegible] no individual and no body of people can really succeed

This speech is too long I cannot help it Precedent insists on my saying [illegible] things but I have left to the last the most pleasant part of my duty [illegible] to propose the Health of our Guests coupled with the names of Sir John [illegible] Bradford Mr Eason and Dr Goodbody (cheers) You do not require any [illegible] to Sir John Rose Bradford for he is as you all know, a member of [illegible] Consultative Board and holds the exalted post of President of the Royal [illegible] of Physicians (cheers) He is the son of an old naval medical officer and we [illegible] great friends for many many years Sir John's first love was physiology, [illegible] he is a D Sc in that subject but fortunately for us for our Consultative [illegible] for the Royal College of Physicians he threw himself whole heartedly [illegible] of medicine Mr Eason is not only the Superintendent of Guy's [illegible] teaching school (cheers) but is an eminent eye surgeon, a [illegible] who loves the Navy Sir Berkeley Moynihan, the President [illegible] College of Surgeons, is also on our new Consultative Board We

invited him to our [illegible] to-night but [illegible] been prevented from accepting. Professor [illegible] physiologist whom some of you have blessed [illegible] (laughter) should also have been here [illegible] the engagement which to our [illegible] represents the Services on the British M[illegible] the section. He is always willing to help [illegible] for what he has done. He is interested [illegible] that is what attracted him here to-night (l[illegible]) drink to the health of our three guests [illegible] M[illegible] Lasoe and Dr Goodbody (loud cheers)

Sir John Rose Bradford in his reply said [illegible] spoken [illegible] kindly about himself and he would ask [illegible] many of the kind things the M D G had said. Continuing [illegible] he felt he ought to speak to such an assembly with great diffidence [illegible] was a naval surgeon and to such an assembly he felt somewhat [illegible] family history of many generations of naval [illegible] behind him and he [illegible] the last of his race. After the Director's [illegible] on physiognomy he felt rather uncomfortable (laughter). With reference [illegible] President's remark on two bottles of whisky a day (laughter) [illegible] said that whatever were the views on the dietetic value of such consumption he was forced to admit that judging by the superlative state of health of all [illegible] the Navy had made a great discovery (loud laughter). He the speaker [illegible] highly value the close and intimate relationship existing between the civil and Service medical branches. The difficulty which the Services were experiencing in getting the type of medical man they required was felt just as [illegible] the various appointments in civil life. In conclusion he thanked [illegible] for the hearty manner in which they had responded to the toast and [illegible] he was very delighted to have been a guest of the Club.

Mr Lasoe in his reply said he was very grateful [illegible] be with the Club that evening, so much so that he had bought a copy of the photograph taken before the beginning of dinner (laughter). There was [illegible] and at his first dinner the newly elected member had to justify his existence in his maiden speech. The President of the Royal College of Physicians had done that not only at the Club's dinner but throughout the whole of his career (cheers). The speaker continued that for himself he could only say that if he could begin his existence over again and provided he was not again built on such frail lines, he would have been in the naval medical service. He knew but little of naval traditions and its life generally, but what little he had seen he admired greatly. He valued the honour of being a member of the Consultative Board and said he felt extremely proud of being a guest of the Club at their annual reunion (cheers).

Dr Goodbody also replied to the toast. He reminded his listeners that he was their guest really as the Chairman of the Services Committee of the British Medical Association. Many of them were members of the British Medical Association but they would like still more naval medical officers to join. It was hard to keep in touch with all their Service members as they were scattered all over the world and if the Association could not have converse with them they could at least write to the British Medical Association, for the Association was very desirous of knowing their wants and his listeners could rest assured the Association was all out to help them (cheers). He was very grateful for the kind invitation to their Club dinner.

The President said he could not allow the evening to close without expressing to the Honorary Secretary their many thanks for having made such perfect arrangements for a truly perfect evening (loud cheers).

Surgeon Commander A T Rivers (Hon Secretary) suitably replied.

NAVAL MEDICAL COMPASSIONATE FUND

At the Quarterly Meeting of the Directors of the Fund held on January 24 three cases were considered and £165 granted to the applicants. The following is a summary of the cases relieved:—

Daughter, aged 6[illegible], of Surgeon in Royal Navy who died in 1895, is unable on account of [illegible] to [illegible] for her own [illegible]. She is in receipt of a small grant from the Royal Naval Benevolent Society but has no other income. Voted £60.

[illegible], aged 58, of Fleet Surgeon in Royal Navy who died in 1878. Application on behalf of three [illegible], aged 61, 52 and [illegible]. They are in receipt of Government Compassionate [illegible], together with [illegible] from a Trust Fund. Voted £35.

Daughter, aged 58, 61 and 56, of a Fleet Surgeon in Royal Navy who died in 1875. Their [illegible] income amounts to £190 only. Voted £30 [illegible].

At the Annual General Meeting of the Subscribers of the Fund held on April 28, 1928, the [illegible] were elected Directors for the ensuing twelve months:

Surgeon Captain C. J. Bashe, O.B.E.	To represent the Active List
Surgeon Captain J. McCutcheon	
Surgeon Captain P. T. Nicholls	
Surgeon Commander J. H. Burdett	
Surgeon Rear Admiral V. G. Thorpe, C.B.E.	To represent the Retired List
Surgeon Captain [illegible] Bosley, C.M.G.	

At the Quarterly Meeting of the Directors of the Fund held on April 26, seven cases were [illegible] and £450 voted to the applicants. The following is a summary of the cases relieved:—

[illegible], aged 70 and 75, of a Deputy Inspector General who died in 1904. The elder [illegible] £70 a year, the younger an income of £60 a year. Voted £25 and £30. [illegible] total amount received of various awards £345.

[illegible] of a Fleet Surgeon who died in 1916. Her total income amounts to £114 [illegible] £30, interest of investments £24. Has a son out of employment [illegible]. Voted £20. Total amount received of various awards £80.

[illegible], 14[illegible], of a Deputy Inspector General who died in 1869. Income amounts to [illegible] recently had to incur a dentist's bill for £10, and her general state of health [illegible]. Voted £15. Total amount received of various awards £240.

Widow, [illegible], of a Surgeon in Royal Navy who died in 1879. The only income is a Widow's Pension [illegible]. Applicant is very frail and requires constant care and attention. Voted £40. Total amount received of various awards £80.

Daughters, [illegible] and 53, of a Fleet Surgeon who died in 1868. The elder sister has an income of [illegible], the younger an income of £40 from investments, and these incomes are supplemented [illegible] little they can earn by dressmaking for friends. [illegible] Voted 25 each. Total amount received of various awards £475.

MEMORIAL DEDICATION SERVICE

A special service was held in the Church of St. Luke at the Royal Naval Hospital, Chatham, on Sunday, May [illegible], on the occasion of the unveiling and dedicating of mural tablets to the memory of the late Surgeon General Christopher Lawson, K.H.P., R.N., and Surgeon Rear Admiral George A. Dreaper, C.B., K.H.S., formerly in command at that Hospital.

The church was filled to its utmost capacity, the congregation including the Medical Director General of the Navy (Surgeon Vice Admiral A. Gaskell, C.B., O.B.E.), Surgeon Rear Admiral [illegible] Sutton, [illegible], Surgeon Commander F. Lewis Smith, Mrs. Harmer, Mrs. Gaskell and Mrs. [illegible]. The service was conducted by Rev. A. Shell, M.A., R.N., Chaplain of the Hospital.

The Medical Director General unveiled the memorials midway through the impressive service with these words: "In grateful remembrance of their lives and of the work done in this Hospital by Surgeon General Christopher Lawson and Surgeon Rear Admiral George Albert Dreaper I unveil these memorials." The Bishop of Rochester then dedicated the tablets. Preaching from the text "Honour a physician with the honour due unto him, for the Lord created him" (Ecclus. [illegible]), the Bishop said he counted it a privilege to be allowed to dedicate those tablets erected in grateful acknowledgment of the eminent services of the two officers who had held high office and at one time were in command of that Hospital. He spoke in appreciative terms of the great work that Hospital had done and was still doing, and which had always been performed under the noblest auspices. It was right therefore that should honour the men who had been in charge of that great institution, and in honouring them honour the profession they represented. They saw in them the same great devotion of their lives, highest skill in carrying out their work, punctiliousness and punctuality, and that cheerfulness which

NAVAL MEDICAL COMPASSIONATE FUND

Account of Receipts and Payments for the year ending December 31, 1927

	£ s. d.	£ s. d.		£ s. d.
[illegible] Bank on January 1, 19[illegible]			Awards to Orphans and Widows	[illegible]
[illegible] Account	[illegible]		Secretary's Allowance	[illegible]
[illegible] Account	[illegible]	[illegible]	Auditor's Fee	[illegible]
[illegible] Consols [illegible] 65]	[illegible]		Bank Charges	[illegible]
[illegible] Stock [illegible]	[illegible]		Stationery	[illegible]
[illegible] War Loan Stock	[illegible]		Balance of cost of Railway Warrant to delegate from Plymouth appointed to attend the Annual General Meeting	[illegible]
Interest [illegible] per cent. National War Bonds [illegible]	[illegible]		Cost of transferring Stock to new Trustees	[illegible]
[illegible] per cent. Consolidated Stock [illegible]	[illegible]	[illegible]	Purchase of £300 3½ per cent. Conversion Stock	[illegible]
[illegible]	[illegible]		Balance at Bank on December 31, 1927:	
[illegible]	[illegible]		Current Account	[illegible]
[illegible] War Stock	[illegible]		Deposit Account	[illegible]
[illegible] War Bonds	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]		
		£585 16 [illegible]		[illegible]

[illegible] Stock [illegible] Bank of England [illegible] 31, 1927 is attached [illegible] 1927 [illegible]

(Sd.) D. F. C. BLUNT
Audit[illegible]

[illegible] the [illegible] Cash Balance [illegible] the name of the Trustees:

- £10,600 [illegible] per cent. Consols
- [illegible] £300 5 per cent. War Loan Stock [illegible]
- [illegible] £1,900 3½ per cent. Conversion Stock
- [illegible] £[illegible] 4 per cent. Consolidated Stock

[illegible]

(Sd.) R. W. B. HALL [illegible]
Hon. [illegible]

[illegible] thing to [illegible] Both [illegible] should be [illegible] like all [illegible]

[illegible] Pearson [illegible] R.N. [illegible] 1928. This [illegible] George Albert [illegible] C.B. [illegible] Hospital, 1920-1928. [illegible] him during that period.

HONOURS

[illegible] on the occasion of His Majesty's Birthday, to [illegible] the Most Excellent Order of the British Empire: [illegible] of the said Most Excellent Order [illegible] R.N. [illegible] of the said Most Excellent Order [illegible] R.N. [illegible] the said Most Excellent Order:— [illegible] R.N. (Retired), Medical Officer, Board of Customs [illegible]

DEGREES

[illegible] W. Nesbitt, M.B., M.R.C.P. [illegible] Ireland. [illegible] M.B. [illegible] the [illegible] as a result of passing [illegible]

[illegible] the M.B. [illegible] as a result of passing [illegible]

PROMOTIONS

[illegible] to be Surgeon Captain, June [illegible] 1928.
[illegible] Heath to be Surgeon Commander, March 21, 1928.
[illegible] Kelley, M.B., to be Surgeon Commander, April [illegible] 1928.
[illegible] W. North to be Surgeon Commander, May 19, 1928.
[illegible] M.B., to be Surgeon Lieutenant-Commander, May 11, 1928.
[illegible] M. [illegible] to be Surgeon Lieutenant-Commander, May 19, 1928.
[illegible] D. [illegible] to be Surgeon Lieutenant-Commander [illegible]
[illegible] to be Surgeon Lieutenant-Commander (D), March [illegible]
[illegible] M.C., to be Surgeon Lieutenant [illegible]

APPOINTMENTS

Medical

[illegible] Heath to [illegible] Hospital [illegible] M.B., [illegible] to R.N. Hospital, Plymouth. [illegible] Williams to [illegible] R.N. [illegible] Service [illegible] L.D.S. [illegible]

Dental

[illegible] M.D., [illegible] to R.N. [illegible] Portsmouth [illegible] M.B., [illegible] to [illegible] (for specialist duties) [illegible] L.D.S., to [illegible]

[illegible]

Surgeon [illegible] Osborne [illegible]

May

Surgeon Commanders J. [illegible] to D[illegible] M.B. [illegible] to Pag[illegible] D.S.O. [illegible] to Ma[illegible] S. Orwin [illegible] O.B.E. [illegible]

Surgeon Lieutenant-Commander [illegible]

Surgeon Lieutenant [illegible] R. S. [illegible] I.M.S. [illegible]

Surgeon Lieutenants [illegible] M.B. [illegible] to R.N.B. Chatham [illegible] to R.N.B. [illegible] E. C. Davis M.B. [illegible] R.N.H. Hong Kong [illegible] M. Clifford A. R. Ewart M.B. [illegible] W. N. Bond M.B. [illegible] R.N. for Short Service [illegible]

Surgeon Lieutenant [illegible]

June

Surgeon Commanders F. J. [illegible] Yard G. F. Syms to R.N.H. Cape of Good Hope F. C. Harold R.N.D. [illegible] D. Is Ferguson to M[illegible] Sungall to Sirius

Surgeon Lieutenant [illegible] N. Nodd of [illegible] Rourke to [illegible]

RETIREMENTS

Surgeon Commander J. Fullarton M.B. placed on retired list on account of age regulations with rank of Surgeon Captain March 7 1928

Surgeon Commander [illegible] E. Hamilton M.B. placed on retired list [illegible] rank of Surgeon Captain March 8 1928

Surgeon Commander C. H. Dawe D.P.H. placed on retired list on account of age regulations with rank of Surgeon Captain April 13 1928

Surgeon Commander F. Cameron M.B. placed on retired list on account of age regulations with rank of Surgeon Captain May 6 1928

Surgeon Commander F. C. Bellman placed on retired list on account of age regulations with rank of Surgeon Captain May 11 1928

Surgeon Commander D. P. H. Pearse placed on retired list [illegible] May 11 1928

QUEEN ALEXANDRA'S ROYAL NAVAL NURSING SERVICE

Entries

Miss [illegible] K. Coleman and Miss Z. [illegible] Rudd entered as Nursing Sisters March [illegible] 1928

Appointments

Superintending Sister Miss A. E. Hartley Jones to [illegible] May 1928

Nursing Sisters Miss [illegible] K. Coleman and Miss Z. G. Rudd to R.N.H. Plymouth March 1928 Miss S. M. S. [illegible] to Dartmouth Sick Quarters April 1928 Miss E. [illegible] R.N.H. Chatham April 1928 Miss C. McL. Ferguson to R.N.H. Haslar May 1928

Resignations &c.

Nursing Sister Miss M. Hellerman's appointment terminated March 8 1928

Nursing Sister Miss [illegible] M. Chapman resigned appointment May 5 1928

Nursing Sister Miss [illegible] M. [illegible] resigned appointment May 11 1928

Nursing Sister Miss [illegible] placed on retired list on account of age regulations [illegible] 1928

Notices

[illegible] Medical Officers to se[illegible] Papers or [illegible] personal experience [illegible] Items of new [illegible] Naval Medical Serv[illegible] welcomed [illegible] home and for[illegible].

[illegible] ations published in [illegible] will become the prop[illegible] of the [illegible] the author [illegible] the copyright to [illegible].

[illegible] Marriages and Deaths are inserted free of charge [illegible].

All Communications should reach the Editors on or before the 1st of the month preceding the date of issue. Unless clearly written they should be typed in order to avoid mistakes and they should be addressed to the Editors Journal of the Royal Naval Medical Service Royal Naval Hospital Haslar Gosport

The Journal of the Royal Naval Medical Service is published [illegible] four numbers comprising one volume

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The payment of subscriptions by Banker's Order is recommended as it relieves the Subscriber of the necessity of forwarding a cheque each year and simplifies the keeping of accounts

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Journal of the Royal Naval Medical Service.

ERRATUM

By an error, which is regretted by the Editors, the word "morale" in DISCIPLINE AND MENTALITY (Surgeon Commander H. B. HILL) *Journal of the Royal Naval Medical Service* July 1928 Vol XIV No 3, was spelt "moral" This should read "morale"

conditions it is possible to conceive and when seen in this stage is always remembered Indeed this very fact accounts for many errors in diagnosis because a man who has worked through a severe outbreak of small-pox, perhaps as a medical officer of a small pox hospital has retained such a mental picture of the more serious cases that, unless his methods of diagnosis are founded on a scientific basis he is apt unwittingly to expect all cases of small pox to be equally serious Now small pox like other infectious diseases is spread by the mild overlooked case and the mild case is missed by the man who expects to find a terrifying condition and cannot believe that a few spots, causing no apparent trouble to the patient can possibly be small pox Such mistakes are less likely to be made if one is familiar with certain definite diagnostic points

As in all pathological conditions from influenza to acute abdomens there occur from time to time cases of small pox in which the clinical signs and symptoms differ in some respects from the usual type and the proportion of these cases varies in different outbreaks Generally speaking, however small pox is rather exceptional in that in the majority of cases it conforms to certain rules The better a man knows those rules the less likely he is to miss a case of small pox

The purpose of this article is to describe shortly the modern methods of diagnosing small-pox, in the hope that it may be of use to the man who is unfamiliar with the disease in helping him to diagnose the more usual type of case Of course there will always occur from time to time in this as in

Volume XIV   October, 1928   No. [illegible]

Journal
of the
Royal Naval Medical Service.

Original Articles.

SMALL POX.

By EDWIN LAWRANCE SIEBERT, O.B.E., M.B.

ANYONE who has seen a patient die from small pox is unlikely to forget the sight. Small pox, in its final stages, is one of the most loathsome conditions it is possible to conceive and when seen in this stage is always remembered. Indeed this very fact accounts for many errors in diagnosis, because a man who has worked through a severe outbreak of small pox, perhaps as a medical officer of a small-pox hospital, has retained such a mental picture of the more serious cases that, unless his methods of diagnosis are founded on a scientific basis, he is apt unwittingly to expect all cases of small pox to be equally serious. Now small pox, like other infectious diseases, is spread by the mild overlooked case and the mild case is missed by the man who expects to find a terrifying condition and cannot believe that a few spots, causing no apparent trouble to the patient, can possibly be small pox. Such mistakes are less likely to be made if one is familiar with certain definite diagnostic points.

As in all pathological conditions, from influenza to acute abdomens, there occur from time to time cases of small pox in which the clinical signs and symptoms differ in some respects from the usual type and the proportion of these cases varies in different outbreaks. Generally speaking, however, small pox is rather exceptional in that in the majority of cases it conforms to certain rules. The better a man knows these rules, the less likely he is to miss a case of small pox.

The purpose of this article is to describe shortly the modern methods of diagnosing small pox, in the hope that it may be of use to the man who is unfamiliar with the disease in helping him to diagnose the more usual type of case. Of course there will always occur from time to time, in this as in

2

other [illegible]
h w [illegible]
[illegible]
w [illegible]

[illegible]

[illegible] gnosis of small pox is that [illegible] Dr W McConnel Wanklyn, the [illegible] Council states that in his [illegible] of overlooked cases It is [illegible] ing, a patient who has a rash [illegible] possibly be a case of small [illegible]

[illegible] most important [illegible] examine the rash *before* hearing the [illegible] the patient [illegible] Many small pox consultants are accus [illegible] ask the medical [illegible] in charge of the case not to tell them [illegible] about it until [illegible] had an opportunity of seeing the rash [illegible] for this [illegible] the eruption of small pox presents certain [illegible] characteristics [illegible] well to have a mind unbiassed by What [illegible] the soldier [illegible] one has noted the proportionate presence [illegible] of these characteristics

[illegible] be allowed to give an instance from personal experience I [illegible] child who had a rash which I decided was not small pox The [illegible] medical man then told me that the child had been in contact with [illegible] was suffering from small pox I held to my original opinion [illegible] later that actually this man did not have small pox but [illegible] If however, I had heard the history first I might have [illegible] very difficult to make up my mind about the child's rash

[illegible] considering the possibility of small pox therefore and *after* [illegible] examined the rash listen to the history of the illness

Last of all weigh carefully all the evidence obtained To take a usual typical case —A man is seen with a rash which, from the distribution and [illegible] appearance could well be a small pox eruption He gives a history [illegible] having recently suffered from what he believed to be an attack of influenza [illegible] attack lasted for some three days at the end of which time he felt [illegible] When he got up he noticed a few spots on his face which later [illegible] spread to other parts of his body Perhaps, on being questioned he [illegible] admits having met about twelve days before the commencement of [illegible] illness someone who had a somewhat similar rash None of these [illegible] alone would justify a definite diagnosis of small pox it is the [illegible] combination of them that makes it certain

Examination of the Rash

The rashes of small pox are first, the *initial toxæmic rashes* which are not always seen and secondly, the *focal rash* which follows the com-

mencing febrile attack. The first is what is usually meant when a person speaks of a small pox eruption and it is the one that the medical man is most frequently called upon to diagnose. It is therefore described first.

Focal Rash.—It sounds superfluous to mention that the patient must be examined in a good light preferably in daylight. It is necessary, however, to emphasize this because of the difficulty, indeed, almost impossibility, of making an accurate diagnosis unless the eruption can be clearly seen. Secondly, the whole of the rash must be inspected. The evidence given by an examination of the face and hands may be entirely negatived when taken in conjunction with that of the remainder of the body.

Distribution of Focal Rash.—The reason for a complete examination will be obvious when considering the question of the distribution of the focal rash. It is not too much to say that the late Dr T. F. Ricketts, the Medical Superintendent of the Small pox Hospitals of the Metropolitan Asylums Board, revolutionized the diagnosis of small pox when he insisted on what he called "diagnosis by distribution."

Summed up his observations showed that the eruption of small pox specially favours irritated surfaces. From that it was easy to understand why the rash tends to be centrifugal in distribution—the face and hands are usually more exposed to constant slight irritation than, for instance, the flanks—or why the contours of the body are more severely affected than the hollows.

In other diseases, of course, the same phenomenon may be seen but not to the same extent as in small pox.

Putting it concisely Ricketts' description of a variolous eruption was as follows —[1]

> The rash prefers the upper half of the body to the lower; it is a rash of the face and arms rather than of the trunk and legs; it is a rash of the distal ends of the limbs rather than of the proximal; of the back of the trunk rather than of the front; of extensor surfaces rather than of flexor; and it is a rash which shuns the most pronounced flexures.

Thinking along these lines it is not surprising to find differences of distribution in individual patients caused by differences in occupation, habits or peculiarities of dress. For instance, a wrist watch may cause an excess of papules over the area covered by the strap; that portion of the body which has recently been rubbed with liniment or covered with a plaster is likely to be more severely attacked by the rash than the corresponding part on the other side; a man who does strenuous manual labour will usually have a more profuse eruption over the shoulders than a sedentary

[1] I am indebted to Messrs Cassell and Co. Ltd. for permission to make this and other quotations from their publication "Diagnosis of Small pox" by Ricketts and Byles.

worker [illegible] and feet of a bed-ridden invalid will [illegible]bly be less affected [illegible] man who walks a great deal.

Allowing, then, for variations due to such personal differences, the eruption [illegible] affects the external surfaces more than the internal, the [illegible] of the body rather than the hollows, the distal ends of the limbs more than the proximal, these being the parts the more subject to external irritation. [illegible] it follows that the forehead is more likely to be affected than the [illegible], the shoulders than the arm-pits, the patella than the popliteal space.

The final point to [illegible] is that the rash extends from above downwards, so that it may be profuse on the face and upper limbs while still sparse on the legs and feet. This fact will be considered in more detail when speaking of the development of the lesion and the question of crops.

THE LESIONS

The main things which used to be taught about the lesions of small-pox were that they were round, shotty and umbilicated. That they are usually round is true; that they are shotty is also frequently true, though this is obviously only [illegible] demonstrated while the lesion is still in the papular stage, while umbilication disappears as pustulation advances. Neither shottiness nor umbilication are safe points in diagnosis. In the most severe cases of small-pox the rash may be soft and superficial, while umbilication may be difficult to find and is often absent at the time when the diagnosis has to be made. Two other statements which used to be made were that a small-pox rash appeared on the soft palate and on the soles of the feet, whereas the rash of chicken-pox did not. The objection to this statement is that it is untrue; the presence of a rash on the soft palate or the soles of the feet does not exclude chicken-pox.

What is important as an accessory means of diagnosis is the life history of the lesion. From its commencement as a tiny papule to the beginning of [illegible] the evolution takes about eight days in a normal case, that is [illegible] a typical lesion spends about two days as a papule, two as a vesicle and four more until the pustule begins to incrust. It is, therefore, [illegible] possible to obtain some idea of the length of time during which [illegible] rash has been present, but it must be remembered that the lesions of modified small-pox, for instance, may evolute more rapidly, while in severe small-pox the time may be prolonged. The distribution of the rash is much more useful evidence in diagnosing small-pox than the condition of the individual lesion.

As mentioned above, the small-pox rash extends from above downwards, so that a rash may be only just appearing on the feet at a time when it has fully developed on the face. This feature probably accounts for the statements made by some people who are not very familiar with the disease that they have seen cases of small-pox in which the rash came out in

[illegible] It is quite possible to see a patient one day when the rash is present on the face and to come back the next day to find it has extended to the legs. This is not that the rash has come out in crops but simply that it has developed from above downwards, the normal method for a variolous eruption.

Initial Rashes

The most that can be expected in ordinary circumstances is that one should remember the existence of the initial rashes of small pox. They are less frequently seen by a medical man than the focal rash and even if he recognizes them he can often do no more than withhold a final diagnosis until the disease has more definitely declared itself. Still, even this may be sufficient to prevent a wrong diagnosis with disastrous results.

The two principal initial rashes of small pox are the petechial and the erythematous. The petechial or purpuric rash generally foretells a severe though not necessarily fatal attack. The rose rashes, on the other hand are more likely to be followed by a benign attack.

The purpuric rash has been called the "bathing drawers rash" because of its preference for the groins. As Dr Wanklyn has pointed out:—"If you ink the fold of the groin and strongly flex the thigh on to the abdomen, the surface of the skin then stained gives a fair approximation of the usual distribution of this rash. It is frequently limited to the groins and the parts near, the lower limit being sharply defined an inch or two below and parallel to Poupart's ligaments. The upper limit is not so defined, the rash sometimes extending to the abdomen and perhaps in pronounced instances into the arm-pits."

The erythematous rash on the other hand is a "transient fugitive rash passing from one part of the skin to another in the course of a few hours." Obviously the erythematous rash is less useful for diagnostic purposes than the purpuric, but as mentioned above these rashes although perhaps not always sufficient to enable a medical man to make a definite diagnosis may cause him if he recollects their relationship to small pox to withhold a definite diagnosis until later.

There are other initial rashes of small pox which are sometimes seen but they are outside the scope of this paper.

The Pre-eruptive Fever

While the rash should first be examined when making a diagnosis of a possible case of small pox the account of the illness preceding the appearance of the rash is often of valuable assistance as confirmatory evidence one way or the other. This is assuming, of course, that reliance can be placed on the history given. When this is so, it will be found that a patient with even a sparse modified eruption has almost invariably suffered from a fairly acute prodromal illness. Such remarks as "The worst attack of influenza

* How to Diagnose Small-pox, by W. McC. Wanklyn. *Ibid.*

[illegible] simply had to go to bed I felt so ill" are a not unusual [illegible] days' febrile attack followed by an eruption which [illegible] perhaps that the patient does not trouble [illegible] days after its appearance

[illegible] not mentioned by the patient though great [illegible] the past by teachers on the presence of backache [illegible] In fact it is sometimes quite difficult even nowadays [illegible] man that a patient is not necessarily suffering [illegible] he has pain in the back. Patients with the illness [illegible] small pox admittedly often do have [illegible] with many other diseases while before now a small [illegible] thought to have an acute *abdominal* condition. [illegible] back but in the belly. Generally the attack [illegible] that is to say the patient complains of [illegible] (even vomiting), pains in the limbs and [illegible] backache or belly ache. In fact he may say he feels "sore all over." The attack lasts three or four days and the patient then feels much better. It is usually about this time that he first notices some spots (papules) on his face and perhaps on his hands.

The variolous attack is now properly speaking over. In some patients the rash passes through its stages of evolution dries up and disappears without further rise of temperature. In others however, there may be considerable secondary pyrexia serious illness and even death, due to suppuration of the rash but this is, as it were, a secondary condition to the variolous attack proper.

From the diagnostic point of view, a history of about three days febrile attack accompanied by muscular pains and prostration and followed by a rash is good confirmatory evidence in a patient who has an eruption which in itself is suspicious of small-pox.

Incubation Period

The incubation period of small-pox is, with singular regularity twelve days counting from the date of contact to the onset of the illness, or fourteen days counting to the outcrop of the rash. So usual is this incubation period found to be, when all the facts are accurately known, that it is questionable whether it is necessary for a medical man, who is not proposing to make a speciality of small-pox, to worry about the small variations which exceptionally occur. This statement needs perhaps, a certain amount of elaboration. For instance, the actual onset of the illness is not always easily fixed. A patient attacked with small pox in the course of some other illness may look upon the commencement of the small pox as a mere exacerbation of his existing condition, while some people have such curiously short memories that they are incapable of saying when exactly they first began to be ill. Still, in a large number of instances the onset will be sudden and the day of the commencement of illness can therefore be fixed definitely.

Should it, however, be impossible to be certain of the date of commencement of the illness there still remains the date on which the rash first appeared though a word of warning is necessary here also. Many patients will not notice the rash until it has been out for perhaps twenty four hours, most of them are unlikely to think much of the elementary papules which first appear, perhaps on the forehead at the roots of the hair. Even hospital nurses, unless they are specially on the look out for it, are liable to give the date of the first appearance of the rash at least a day later than is correct. Here is where a knowledge of the life history of the lesion and of the development of the rash is of value. Obviously a man who says that a profuse rash which is pustular on the feet and drying up on the face has only been present a couple of days is speaking incorrectly while a patient with an unmodified eruption which is already vesicular who states that his rash appeared yesterday probably refers to the day on which he himself first noticed it, whereas it has in reality been present a day or two longer.

Another point is that frequently a patient feels better when the rash first appears, so that if a man says that following an attack which he thought was influenza he felt better on a certain day it is a fair presumption that a careful search would have discovered the beginnings of the eruption on that day, no matter when he himself first noticed it. Allowing, however, for such chances of error as these, it will be found that in the vast majority of instances the incubation period is twelve days to the onset of illness and fourteen days to the outcrop of the rash.

For purposes of diagnosis and from the point of view of administration, so definite an incubation period is of obvious advantage. Suppose a man with a somewhat anomalous rash, who has suffered prior to the appearance of the rash from an acute illness lasting two or three days, the commencement of which can be definitely fixed as say July 16, mentions that while on leave about July 3 or 4 he met a man who had himself been ill and who had the remains of a rash on him at that time. This is at least circumstantial evidence in favour of the patient's illness being possibly small pox. Again, if it is certain that the rash of a patient with small-pox commenced on a certain day, it is obviously unnecessary to worry about the man's movements a month ago. The source of that man's infection must be sought for a fortnight prior to the first appearance of his rash, no matter how unlikely, or even impossible, it seems that he could have been infected then.

It may be thought that this question of the incubation period is being laboured somewhat unduly but, first, patients are sometimes stated to have been infected at a time so much outside the furthest limits of the incubation period of small pox that it is obvious that a mild case of the disease has been overlooked somewhere, which mild case may possibly still be in an infectious state and secondly it is not unknown for it to be alleged that two patients have been infected the one from the other, when actually both of them have caught the disease from a common overlooked source which

a knowl[illegible] of the [illegible] period of small-pox would [illegible] brought to light m[illegible] tal es lead t[illegible] th[illegible] further cases which c[illegible] prevented

[illegible] with Chicken-pox

As chicken-p[illegible] the [illegible] which is more frequently mistaken for small-pox than any other and vice versa it may be of advantage to mention a few points in the differential diagnosis of the two diseases As a practical point it is well to remember that it is at least somewhat uncommon for a person to have escaped chicken-pox in childhood Most people catch chicken pox either before or during their school days If, therefore, a patient of over school age is said to have chicken pox, the greatest care should be taken before agreeing with this diagnosis Chicken-pox has sometimes been diagnosed for some such curious reason as "the rash was so sparse the patient did not seem ill enough for small pox or there was no small pox known to be in the neighbourhood at the time As a result of this kind of reasoning people have been known to contract small pox and to die who need never have done so if sufficient care had been taken to establish whether an adult case of alleged chicken pox was not possibly small-pox It is well therefore to make a habit of always asking whether a patient has previously suffered from chicken pox because it is so unusual for a person to suffer twice from this disease that the fact of his having had it previously is pretty definite proof that whatever he is now suffering from it is not chicken pox

Small-pox	Chicken-pox
1 The rash is most abundant on the face [illegible] on the abdomen and chest	1 The [illegible] and chest are covered as thickly as the face or more thickly
The rash is much more abundant on [illegible] than on the abdomen	2 The abdomen is covered equally with the back
The rash is more abundant on the [illegible] than on the [illegible] and on [illegible] than on the abdomen	3 The distribution is different
4 [illegible] the limbs and [illegible] next to the face	4 The rash tends to avoid the limbs
[illegible] distribution on the limbs is centri[illegible]	5 The distribution on the limbs is centripetal
[illegible]	6 The rash behaves differently
[illegible] deep seated and have [illegible] base	7 The lesions are superficial and the base is not infiltrated
[illegible] are generally circular in [illegible]	8 The lesions frequently have an irregular outline when they lie near a flexure they are apt to be oval or elongated
[illegible] generally are multilocular	9 The vesicles generally are unilocular
[illegible] the vesicles are [illegible]	10 The vesicles are never umbilicated and seldom elongated

The preceding summary of the chief points of difference between small-pox and chicken-pox is taken from "The Diagnosis of Small-pox" by Ricketts and Byles. Like all other diagnostic statements it is liable to exceptions but in the vast majority of cases some if not all of the differences mentioned will be found and will generally be sufficient to clinch the diagnosis one way or another. The chief points of difference therefore are as on preceding page.

Administration

In administration is included the isolation of the patient to prevent him infecting other people, the protection by vaccination of those who have been in contact with him, the supervision of the contacts until they are free from any chance of falling victims to the disease and the search for the source of infection of the original patient, as well as of course, for any "missed" cases that may have been infected from the same source but previously overlooked.

The *isolation of the patient* includes placing him in a small-pox hospital and sterilizing everything that has been in contact with him. A point which should not be overlooked is that everybody who has any official dealings with the patient, such as accompanying him to hospital, sorting out his clothes, &c., must be protected by vaccination. It is very easy for a medical man to remember such contacts as relatives, messuates, &c., and entirely to overlook himself, the ambulance attendants, the disinfecting staff and other people who have come in contact with the patient in an official position.

The chief point of difference between *anti-small-pox vaccination* and most other inoculations, with the exception of that against rabies, is that the patient can be protected after being in a position to be infected. By means of anti-diphtheritic or anti-typhoid inoculations a person can be protected against diphtheria or typhoid provided the inoculation is done some time previously, but once he comes in contact with either of these diseases it is too late to protect him by inoculation. In small-pox, however, it is different. Admittedly it is much safer to have been recently successfully vaccinated before coming into contact with small-pox. If, however, a person is vaccinated immediately after contact, he stands an excellent chance of escaping the disease. This chance lessens with every day of delay in vaccination after contact with small-pox, so that by the third or fourth day after contact it is doubtful if it will prevent an attack. It is thus of great importance successfully to vaccinate contacts immediately it is known that they may have been infected.

From this it follows that it is necessary to make sure of obtaining a complete list of contacts as soon as possible. To do this it is as well to spread a wide net but on the other hand to use discretion. For instance, certain people will be obvious contacts, namely, close friends, workmates, &c., others will be probable contacts, others, again, may be possible

contacts [illegible] will be a fourth [illegible] would not conceivably have been [illegible] the patient The [illegible] that the [illegible] of [illegible] and while frequently [illegible] who ought to have been vaccinated first of all There [illegible] to vaccinate a whole ship's company because the gun[illegible] has contracted small-pox ashore On the other hand every effort should be made to ensure that a complete list is made of people who are likely to have been in contact with the messman on board and ashore constantly [illegible] from the time when his illness commenced and that vaccination is offered to all of them at the earliest possible moment

When considering the question of *supervision of contacts*, it is essential to recognize that no man is infectious until he actually has the disease It is necessary to emphasize this because non medical persons frequently desire contacts to be treated as if they were patients There is no need to isolate small pox contacts All that is required is that they shall be seen daily for sixteen days from the date of their last contact with the patient (some people like to be on the safe side and to make it twenty one days) to make sure they are quite well At the first symptoms of illness they should be isolated as potential cases of small-pox

The *search for the source of infection* is frequently unsuccessful This is to be expected because, though the exact date of the onset of the illness or of the first appearance of the eruption may be known and consequently the date of infection can be fixed with fair certainty it is very difficult for a man, even with the best will in the world accurately to remember everyone he met so long a time ago and it is possible, of course, that he may have been infected by some unknown person who rubbed up against him in a theatre or an omnibus Whether however the source of infection is finally discovered or no the Authorities of all places which the patient visited during the probable time of his infection should be notified in order that they themselves can search for possible overlooked cases that may still be infectious to susceptible persons

SUMMARY

It is not possible to discuss here every known variety of small pox, from the mild case with perhaps but a dozen ill-developed spots to the severe toxic, confluent and hæmorrhagic cases It is only desired to give a description of the methods of approaching a case which may turn out to be small pox Indeed, this article is written, not for the specialist, but for the man who is likely to be sent for, once in a while, to make, it may be, a diagnosis of a doubtful rash It is hoped that even though he may never before have seen a case of small-pox what has been set out here may put him on the right lines for examining the patient and may assist him to diagnose an ordinary straightforward case at least

To sum up then, first, always bear small-pox in mind the first case

may come unexpectedly out of the blue. Secondly, examine the rash and try to decide before listening to the history, whether it can possibly be a small-pox eruption. Thirdly, having examined the rash and having listened to the history, consider the whole of the evidence available before finally making a diagnosis.

When examining the rash, notice of what kind it is. Is it erythematous, purpuric, papular, vesicular or pustular? Can it be one of the initial rashes of small-pox, either the fleeting, fugitive erythematous rash or the petechial rash with its "bathing drawers" distribution? If it is either papular, vesicular or pustular, what is its distribution? Is it a rash rather of face and arms than of trunk and legs? Is it centripetal or centrifugal in disposition? Does the eruption in the main show preference for contours and tend to avoid the more sheltered parts? How does it behave towards irritated surfaces? Are the individual papules mostly round and deep-seated, or are they irregularly shaped to the folds of the skin looking like more superficial blisters?

What about the history? Has the patient previously had chicken pox? Is the rash new to him or has he had previous similar attacks? Has there been any febrile attack preceding the appearance of the rash? Is there any suggestion of contact a fortnight or so previously, with what might have been a case of small-pox?

Now sum up the evidence carefully, reviewing the arguments for and against a diagnosis of small-pox. Do not be unduly swayed one way or another because certain things fail to fit the picture. There are exceptions to every rule. For instance, the presence of a few spots in the axilla when the rest of the evidence is in favour of small-pox will not affect the diagnosis, while the rash of a patient with undoubted chicken pox may here and there show a preference for an irritated surface. If the mass of the available evidence points to small-pox the fact of a few deviations from a complete textbook description of the disease should not be allowed to upset this diagnosis. Often has a case of small-pox been missed for such weak reasons as "some of the spots seemed superficial," "the patient was not ill enough," when in other respects the diagnosis was as plain as a pikestaff."

Finally, beware of over-confidence. In nine cases of small-pox the diagnosis may be simple, in the tenth it may be extremely difficult, so difficult indeed that even with the greatest care an immediate correct diagnosis is impossible. Treat such a case as a possible small-pox; this is the safest course. Carelessness is a crime, but an inability to make an immediate diagnosis is not. The greatest experts are liable to error in small-pox diagnosis. In fact, the man who says he can diagnose any case of small-pox at sight is either a liar or he has little knowledge of small-pox. Probably both. With ordinary care, however, it is usually possible to avoid the kind of misdiagnosis which leads to the occurrence of further cases because, and this is a cheering thought, most doubtful cases declare

thems[illegible] and the [illegible] becomes plain Therefore treat the [illegible] as though it [illegible] small-pox so far as isolation [illegible] and vaccination [illegible] are concerned the patient [illegible] observed with [illegible] conscience, until the diagnosis [illegible]

In conclusion it is necessary to point out that however good the description of a [illegible] disease may be it is difficult for a reader to retain a clear impression of it without some practical experience With skin affections, however when it is not possible to see actual patients, pictures of the disease make a very good substitute Especially is this so when as in small pox the diagnosis turns so largely on the distribution of the rash Readers wishing to become familiar with the eruption of small pox but who are not in a position to see patients suffering from the disease, are referred to Ricketts and Byles Diagnosis of Small-pox in which all varieties of the disease are described and excellent illustrations are shown of the rash in different stages As a useful pocket aid to diagnosis may be mentioned a 6d pamphlet entitled "The Accurate Diagnosis of Small pox by W McConnel Wanklyn It is obtainable from *The Medical Officer* 34-36 Whitefriars Street, E C 4

It is worth while spending a little time in learning to recognize small pox It is a disease which frequently causes loss of life and horrible disfigurement Incidentally it also causes a considerable expenditure of public money The sooner the diagnosis is made, the sooner does the patient cease to be a source of danger to others Even a somewhat superficial knowledge of small pox diagnosis may be sufficient to check an outbreak at its first case.

OPERATIONS AT NANKING

By Surgeon Commander W P Vicary

March 20-26 1927

H M S *Emerald* had been lying off Nanking since January 11 1927, with the exception of a week spent at Wuhu early in March, where she had been sent to recapture a British river steamer which had been commandeered by the Nationalist troops

The local situation at Nanking on March 20 1927 was that the Northern Army consisting of Shantung and Chihli troops together with 5000 Russian "White" soldiers under the command of Marshal Chang Chung Chang were occupying the city For some days past, various rumours had filtered through concerning the position of the Nationalist (or Southern) forces who were advancing rapidly from the southward There was much tenseness and uneasiness amongst the civil population in Nanking, and many were leaving the city by river steamers and sampans

The [illegible] ashore suddenly [illegible] and during the next few days a scheme was drawn up for the [illegible] of all foreigners in the city. The Americans made their own plans, which, however, corresponded with the British. As the foreign population ashore was somewhat scattered the scheme consisted of concentrating the people in groups, each in charge of a group leader, at certain places in the city, where they could be evacuated as expeditiously as possible, if occasion arose.

I. Evacuate women and children.
II. Concentrate groups as arranged.
III. Evacuate all men.

The Northern troops continued to cross the river from [illegible] to Nanking in large numbers, amongst them being Russian cavalry and an armoured train manned by "White" Russians. This train was ferried across the river in junks—no easy feat—and placed on the Shanghai-Nanking railway, and was subsequently captured by the Nationalists in Shanghai after the

rails had [illegible] and the Russians had expended [illegible].

On [illegible] March [illegible] reported that the enemy was not within [illegible] the *Emerald* the sound of gunfire [illegible] telegraphic communication with Shanghai [illegible] was blocked with troop trains. The Senior Naval Officer, Captain H. I. England, R.N., wished to evacuate all foreigners from the city, but the Consul General considered this step unnecessary, it being the opinion of most people ashore that the Northerners would defend Nanking to the bitter end, as it was their last stronghold south of the River Yangtse.

On Monday, March 21, the Northern troops commenced to retreat up the railway from Changchow, and also to fall back on the city from the southward, and a few crossed the river to Pukow in the three transports [illegible] at Nanking.

The executions increased daily, many of these being done on the bund in full view of the ship. Gunfire increased in intensity, and could be plainly heard a few miles from the city wall, but nothing could be seen, nor did any information come through. During the evening a detachment of marines was landed from the *Emerald*, and were sent to the British Consulate, but were unable to gain admittance through the city wall. Armed parties were placed on board the British owned hulks belonging to the shipping firms of Jardine Matheson and Butterfield and Swire, and also in the International Export Company's factory, Hogee, to prevent looting. It was definitely decided by both British and American authorities, to evacuate all women and children the next morning, Tuesday, March 22. The evacuation was proceeded with at 6 a.m., and some seventy-five women and children arrived on board, with the exception of six who preferred to remain ashore. The accommodation and feeding of such a large number of persons put a considerable strain on the messing staff of the ship, but later in the day the s.s. *Poyang* arrived, and after an armed guard had been placed on board to prevent some thousands of Chinese boarding her in their efforts to escape from Nanking (amongst these being the Civil Governor of Nanking), sixty-two refugees were transferred to her for passage to Shanghai. Meanwhile, twenty marines were got through to the consulate in batches, some of these were unarmed, but several revolvers were smuggled in with them. The U.S.S. *William B. Preston* arrived during the day and anchored close to the U.S.S. *Noa*. The Northerners still continued to retire, but the city was quiet, except for occasional bursts of rifle fire, which was apparently necessary to check disorder amongst the troops. On Wednesday, March 23, a report was received from Captain Spear, the Intelligence Officer of the Shanghai Defence Force, who had been out to the southern end of the city, that the Northern forces were retreating rapidly through the south gate, the Southerners being three miles away. At 16.00 hours large bodies of troops were seen to be retreating

hastily along the road by the river bank to Hsia Kwan Shortly afterwards thousands of Northern troops appeared on the bund, amongst the first to arrive were the 'White' Russian cavalry Much firing came from the city owing to the attempts made by the Northern officers to stem the retreat The warning signal to concentrate was immediately sent out to all foreign residents, and the concentration was successfully carried out Meanwhile the whole length of the bund at Hsia Kwan was crowded with panic stricken soldiers rifles and equipment were thrown away and their one aim was to cross the river There was no time for looting, and the British hulks were left unmolested, as also was Hogee which was too far away Every available sampan junk and steamboat was commandeered by the troops to get across the river and boats that would not wait for more occupants were fired on from the river bund, and many soldiers fell into the river and were drowned The three transports lay off for some time in order to stop the panic but eventually they went alongside and were immediately packed with troops Russian soldiers stationed at the gangways fired into the crowds to prevent the ships being rushed To avoid being commandeered four British and American owned launches took shelter alongside the *Emerald* and an officer was sent down the river to fetch two British tugs, which were towing lighters to Hankow One Hogee launch was captured by four Chinese soldiers who made off down river in her, and for some inexplicable reason they landed at Hogee, where they were disarmed by British soldiers and put outside the premises

At this time the *Emerald* was subjected to a heavy fire of stray bullets and as it continued it was found necessary to clear the after deck on the port side The Japanese destroyers who were nearer in shore moved further up stream to be out of the line of fire At 20 00 hours the bund was quieter troops ceased to rush the transports which were constantly crossing the river full of soldiers As many foreigners as possible were taken on board the ships, or else they were sent to Hogee The Southerners now occupied the old city of Nanking and the Northerners as soon as they reached Pukow, boarded the trains and fled to the north

During the night of March 24 it was estimated that 20 000 to 30 000 troops had crossed the river no attempt to resist the advance of the Nationalists was made on either side of the river and at 07 00 hours the Southerners had arrived on the bund, and immediately started a fusillade of machine gun and rifle fire in all directions The three transports still continued to carry soldiers across to Pukow until the ship's officer found that the guards who had been in charge of them had left, and then they hastily steamed off down river During this period the *Emerald* was heavily fired on from the south bank of the river by Southern soldiers orders were issued for all deadlights to be closed down and the upper deck portside to be cleared However some ratings could not restrain their curiosity to see what was happening and Able Seaman *John Knox* was struck in the head by a bullet, the bullet entered the skull on the right

side of the [illegible] and emerged [illegible] the right [illegible] was found to [illegible] all [illegible]

Meanwhile [illegible] the hulks were experiencing an extremely bad time [illegible] exposed to rifle fire and had to be kept lying down for [illegible] thin wooden sides of the hulks offered small resistance to bullets fired at close range They were under orders not to return the fire owing to the dangers of retaliation by the Southerners on foreigners still left in the city, although several attempts were made to break into the hulks The Northerners across the river at Pukow had commenced setting fire to the town, and the s s *Pamaat Lenna*, a Bolshevist steamer captured with Madame Borodin on board some weeks previously was scuttled and sank in the river with her upper decks awash Clouds of smoke were seen issuing from the Standard Oil Company's Works but luckily only a small oil tank and godown were burned and the large tank was undamaged

A party consisting of the American Consul some civilians and American seamen who were taking refuge in the Standard Oil Company's house on Socony Hill were surrounded by the Nationalists They signalled the news that the British American and Japanese consulates had been looted that Dr L Satchwell Smith and Mr Huber harbour master had been killed and that the British Consul General and Captain Spear had been wounded Another party of marines and civilians who had been cut off from the consulate, were pursued by the Nationalist soldiers and took refuge in Socony Hill with the American Consul and his party Later in the day two signalmen and twelve marines arrived at the hulks They had been severely handled on their way through the city, having been robbed of all their valuables, and in one case one man was captured by a Nationalist soldier and led away for execution but was saved by the intervention of an officer All rings had been removed from their fingers and several of the men had badly bruised fingers as a result of the severe handling they received

The firing at this time was so intense that it was decided to abandon the hulks and this was carried out with only one casualty the Japanese losing one man whilst abandoning their hulk

At 12 30 hours the *Emerald* was cleared for action and the guns crews together with a landing party stood by for immediate action

Hopes was abandoned at 15 30 as a large mob of soldiers and coolies had surrounded it and it was found impossible to hold it any longer without firing

The *Alerte*, a French gunboat, arrived at 15 00 hours and H M S *Wolsey* at 14 40 having been ordered down from Wuhu At 15 30 an urgent signal was received from Socony Hill for U S S *Noa* asking ships to open fire action stations were sounded off and the *Emerald*, U S S *Noa* and *Preston* fired three salvoes of high explosive over Socony Hill to

th[illegible] the Standard Oil Company's house The effect was immediate all [illegible] at once and by the end of the first salvo not a person co[illegible] in the bund the soldiers being the first to leave The ships c[illegible] one or two salvoes of shrapnel per minute, which burst over th[illegible] Socony Hill between the British consulate and the Standard Oil Company's house Two Chinese gunboats steamed down river at this point with the intention of shelling the railway line at the back of Pukow However when the bombardment commenced they turned round and disappeared up river again enveloped in clouds of smoke During the bombardment a combined landing party of British and American sailors were landed on the bund and H M S *Wolsey* was sent close inshore to cover the landing This party marched to the foot of the city wall without any opposition here they met the party including the American Consul, who immediately the bombardment had started had left the house on Socony Hill and ran down to the top of the city wall They constructed a rope of sheets and blankets taken from the house and slid down the wall on this Several women and two children of only 4 and 6 years, had to undertake this somewhat hazardous method of escape and were got safely on board the ships One of the last to climb down the wall was an American a Mr Earle Hobart, unfortunately when about fifteen feet from the base of the wall the sheet broke, and he fell with all his weight on his left foot which doubled up under him His friends carried him the rest of the way down to the bund and brought him on board the *Wolsey*, where temporary splints were applied, and he was transferred to the *Emerald* On examination he was found to have a marked valgus deformity of the left foot the astragalus was palpable in front of the ankle and there was crepitation and the general condition of the foot showed there was a forward and outward dislocation of the astragalus A general anaesthetic was given and the dislocation was reduced, and as far as could be ascertained without x ray examination the fracture was in good alignment A fairly good position having been secured, the leg was put up in a Neville's back splint with lateral splints Eventually he was sent down to Shanghai in a U S destroyer two days later, much to our regret, as he was a most charming man and a wonderful patient

The occupants of the house on Socony Hill reported that they had been surrounded and were being constantly fired on since they took refuge in the house The Chinese soldiers at first entered the house, but withdrew when they saw that some of the foreigners were armed They then took up positions in other adjacent houses and fired into Socony House But when the bombardment commenced they fled but not before several had been shot by sailors in the party The guns ceased fire at 16 15 after the *Emerald* had fired some eighty-three rounds and the *Noa* and the *Preston* a similar number As there was some activity around the guns on Lion Hill the *Emerald* trained her guns on that position, but no further action was necessary At this moment a large delegation was seen concentrating

on the bund [illegible] custom house waving flags apparently to attract our attention. [illegible] guard was sent in to bring them off to the ship and it was found that they were members of the *Red Swastika Society* who had been sent by the Consul General to negotiate. [illegible] foreigners also came on board [illegible]. They stated that the Chinese were quite friendly [illegible] the foreign warships were [illegible] the Nationalists. The consulate party consisting of the Consul General and [illegible] and Captain Spear, seven [illegible] and two [illegible].

[illegible] then presented to the delegates:

(1) [illegible] to be returned to the ship at once, and [illegible] property was to be assured.

(2) [illegible] at once.

(3) [illegible] best troops were to guard the three [illegible].

(4) [illegible] present himself on board with a full [illegible].

(5) [illegible] Nanking would [illegible].

The U.S.S. [illegible] the flag of Rear Admiral Hough, U.S.A. [illegible] the Northerners set fire to the [illegible] to the ground.

[illegible] all available refugees was dispatched [illegible] escorted by the U.S.S. *Preston* [illegible] H.M.S. [illegible] were fired on from the International Export [illegible] was returned. Later, two Chinese gun[illegible] and were fired on but did not reply, and then [illegible] himself arrived from Wuhu in another gunboat. [illegible] two American destroyers and also two Japanese [illegible] decided to co-operate, *cleared for action* as [illegible] the Chinese delegates or of any of the [illegible]. However, a little later a deputation arrived on the [illegible] flags and with them were the party from the consulate [illegible] it was found that they had been concealed in the [illegible] whilst the consulate was being looted and had been cared [illegible] the Chinese servants. They had been robbed and were [illegible] threatened with death, the Consul himself being actually taken [illegible]. The executioner's sword actually swung over his head [illegible] all the foreigners ashore had been accounted for, and of the 150 [illegible] who had taken refuge in the University one, Dr. Williams, had been killed, and one lady was severely wounded, and one French and one Italian priest were also killed. Stretcher parties were sent from the *Emerald* to meet the consulate party on the bund, as both the Consul General and Captain Spear were reported to be severely wounded. The Consul General was found to be suffering from a bullet wound through

the fleshy part of the left thigh The bullet had emerged from the back of the leg and had not touched the bone He had lain on the floor of the consulate lodge for over twenty four hours and had no dressings applied but it healed up remarkably quickly after having treatment on board

Captain Spear was in a much worse condition he had been shot through the right forearm and left leg thirty six hours previously and at the time the only treatment possible was the application of improvised tourniquets which were applied by the marines imprisoned in the lodge with him In spite of this he had lost a great deal of blood and was suffering from a severe degree of shock when brought on board The bullet had entered his right forearm at the junction of upper and middle thirds and emerged through the upper third There had been considerable haemorrhage from the wound which had continued for twelve hours but had ceased on his arrival on board The whole forearm was much swollen due to the tightness of the tourniquet which had been left in position for a considerable time and he had also evidences of injury to his ulnar nerve Another bullet had struck his left leg below the knee on the inner side of the middle third and emerged on the outer side Luckily he escaped without any injury to the bones in either limb Both wounds were thoroughly cleansed with lotio hyd perchlor , and eusol dressings were applied

H M S *Dauntless* arrived during the day and as she was leaving for Shanghai he was transferred to her for passage to hospital at Shanghai and at the same time the bodies of Mr Huber, the harbour master Dr L Satchwell Smith, and Able Seaman *John Knox* over whom a short memorial service was held on the quarter deck were also transferred to the *Dauntless*

A Chinese deck-hand belonging to one of the British-owned tugs taking shelter alongside the *Emerald* was shot through the right thigh the bullet being found in his trousers when they were being removed He made a rapid recovery

During the next few days the situation gradually settled down although it was impossible for any foreigner to have communication with the shore Later on, the Chinese servants gradually appeared on board, bringing information of the looting of all foreign residences and many brought on board articles of attire &c belonging to their owners, that they had managed to rescue

The Chinese greatly exaggerated the result of the bombardment the most absurd being that 200 000 Chinese had been killed

It seems to have been definitely established that the looting of foreign residences especially British, was pre arranged The parties were controlled by bugle and whistle and it was only because of the greed for loot that they were delayed so long in the old city of Nanking and the lives of many foreigners were saved

The most surprising thing to us in the *Emerald* was the absence of casualties amongst the landing parties and the ships company Except

for Able [illegible] *Kiwi* no member of the ship's company was hit The platoon in the International Export Company's factory [illegible] and in the [illegible] under both rifle and machine gun fire for some hours, and when they had orders to evacuate their posts they were fired on at close range [illegible] however are most inferior shots firing mainly from the hip [illegible] is more danger from stray bullets than from direct fire The ship [illegible] moved further up the river when all the foreign population had been evacuated in order to be out of the line of fire We remained seven [illegible] in Nanking being unable to go ashore

The Northerners by this time had returned to Pukow, and every day the North and South used to shell each other across the river the damage on both sides being trivial as a large percentage of shells fell into the river and when we left for Shanghai on May 11 1927, the duel was still continuing

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THE HEALTH OF THE NAVY[1]

By Surgeon Commander D H C GIVEN M D D P H R N

I Standards of Physical Fitness in East and West —Distinction between [illegible] biological [illegible] Health standards Contrast in sickness records [illegible] East and West (Tables I and II) A high dental standard associated with a high [illegible] health characteristic of the East The problems of [illegible] infection [illegible] tonsils and adenoids rheumatic fever chronic rheumatism defective [illegible] [illegible] with in a [illegible] communities

II [illegible] History —Changing civilization and the changing disease picture in [illegible] Diseases that have followed in the wake of industrial prosperity New [illegible] and new diseases diabetes disease of tonsillar and adenoid tissues [illegible] surgical diseases of digestive tract the rheumatisms cancer &c

III [illegible] of the Dominant Diseases of Civilization (1) Changes in the dietary [illegible] refined sugar and refined flour Great development of pastry cook and con[illegible] (2) Changes in habits The great increase of sedentary occupations The [illegible] with the development of power labour saving devices mechanical [illegible] Increased wages and higher standard of living Saccharism a new path[illegible] steadily replacing Alcoholism

IV [illegible] Saccharism (Tables I and II) —[illegible] the most important factor [illegible] diseases to-day (1) Diabetes mortality in relation to increased con[illegible] (2) Effect on metabolism of [illegible] combined with insufficient [illegible] Metabolic stasis and its sequel lowered resistance to infection Exercise [illegible] Nature's standard of fitness (3) Vitamin deficiency Effect of food [illegible] the abuse of cooking Vitamin deficiency and over eating [illegible] Summary of Modern Pathology and its Foundation —(A) *Defects of metabolic origin* [illegible] failure of teeth sweet eating and intolerance with absorption of bone forming [illegible] Weakness of tonsillar and adenoid tissues—predisposition to hypertrophy and [illegible] natural defensive mechanism of the blood defective susceptibility to infection [illegible] (d) Deranged muscle metabolism and chronic rheumatism (e) Deranged [illegible] metabolism and obesity (B) *Diseases of the digestive system* —(1) The evidence [illegible] and four suggests overwork (2) Dental caries—the [illegible] refined [illegible] production minimum of enamel and defective dentine Sepsis [illegible] local [illegible] development (3) Diseases of tonsils and adenoids—appear to be of increasing [illegible] local disease precedes systemic infection (4) Gastritis ulcers of stomach and

[1] [illegible] on the etiology treatment [illegible] [illegible] diseases in the Navy based [illegible] study of the health of [illegible] Eastern labour force.

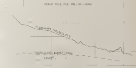
Returning to this country after having spent almost five years in the study of the health of a mixed labour force in Singapore one feels justified in making a few suggestive observations on the health of the Navy.

I.—Standards of Fitness

The criterion of fitness in a labour force in the East is a man's ability to carry out six to eight hours' hard manual labour under tropical conditions. We possess no such criterion in the Navy, and the increasing tendency to adiposity suggests a depreciation of physical efficiency. There is reason to believe that the conditions of life in the modern Navy are becoming less and less conducive to the maintenance of a high all-round standard of physical fitness than they were in the days of the sailing ship. The responsibility for drawing the attention of the executive authorities to evidences and causes of physical depreciation falls upon the naval medical service. Unfortunately we possess at the moment no tests or standards by which any loss of efficiency can be demonstrated or measured. *One of the first essentials to the study of health is the possession of tests which by real physical well-being can be distinguished from its over fed imitation.*

Health Standards.—A contrast in sickness records (Tables I and II) throws into relief certain important particulars in which the health of the bluejacket falls far below that of the native labourer. A phenomenon characteristic of all Eastern races with whom I have come into contact both in Malaya and China is the high dental standard associated with a high standard of abdominal health, well illustrated in these tables. Pre-

[illegible] alone of the [illegible] skin, [illegible] insignificant by [illegible] races. [illegible] although [illegible] from [illegible] health standard [illegible] the [illegible] absence of [illegible] specific disease [illegible] the health of the lower animal, and the complete [illegible] among 100 women and children on the Base over a [illegible] months is not merely an accident of small numbers. To [illegible] observation for even this short period some fifty children [illegible] without a sign of illness or disability would certainly [illegible] in this country to say the least of it. Chronic [illegible] so common to every class of the [illegible] were practically never met with in our labour [illegible]. The weedy [illegible] labourer—never the Chinaman—suffared [illegible] muscular rheumatism as the result of severe exposure under [illegible] while working in swamps but the disease was never of the [illegible] intractable variety. Lastly, as the result of extensive inquiries [illegible] vations in Malaya and China, cancer, particularly cancer of the [illegible] tract, is a very rare disease. Is it not significant that bacterio[illegible] have never offered any explanation to account for the origin of [illegible] ration? Bacteriology has also completely failed to explain the [illegible] of rheumatism, acute or chronic, of cancer or even of dental disease. Although it may sound a heresy I propose to advance the thesis that the [illegible] of these diseases are of macroscopic, not microscopic proportions.



II.—The Lessons of History

History teaches us that the march of civilization is responsible for constant changes to which the changing disease picture in civilization is attributable. A century ago pulmonary tuberculosis was the scourge of civilization in this country. It was a disease—closely associated with the

birth of industry—brought about by the sudden change from rural conditions to overcrowding in cities together with the insanitary associations of factory and workshop. Other contributory causes were long hours of work, poor wages, under nutrition, &c. There were here causes of "lowered vitality" that would have been attended with disease in any race or community. Since those days the pendulum has swung far to the other extreme and the diseases in the ascendant to-day belong to quite a different category—diseases that would appear to have followed in the wake of industrial prosperity—diabetes, surgical diseases of the digestive tract, diseases of the teeth, cancer, &c. Argument will be put forward which suggests that these diseases have sprung from a common ancestry represented by a combination of causes that have come into existence within the last half century.

TABLE I.—A CONTRAST IN SICKNESS RECORDS

Sickness in the Navy (total force 1970) Contrasted with Sickness in the Native Labour Force, Singapore Base

Ratio per 1,000 of strength (decimals omitted)

Disease group	Case rate		Days sick ratio rate	
	Navy	Labour Force	Navy	Labour Force
Infections	45	110	765	1,821
Venereal disease	[illegible]	9	1,719	270
Nervous and mental	5	8	234	166
Eye, ear, nose	16	14	347	315
Circulatory system	4	1[illegible]	351	0
Lymphatic system	[illegible]	[illegible]	84	104
Respiratory system	7	177	708	399
Digestive system	**81**	**27**	**1,182**	**50**
Nutrition, metabolism	1	5	15	72
Generative system	7	1	197	2
Organs of locomotion	9	11	182	140
Skin, areolar tissue	51	4	184	111
Urinary organs	2	3	91	62
Tumours	2		40	—
Miscellaneous	1	8	18	37
Total sickness	370	380	6,161	4,011
Total injuries	87	73	1,161	717

[1] Chief infection—malaria.
Chief cause of sickness [illegible]
One death [illegible] disease of arteries.
[1] Chief cause [illegible] climatic [illegible]
All cases of [illegible]
Muscular rheumatism [illegible] of [illegible] type [illegible]
[illegible] (the Tamil labourer only)
[1] [illegible] part [illegible] common [illegible] sickness.

[illegible]

[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]	-	[illegible]		[illegible]
[illegible]	[illegible]	[illegible]		[illegible]
[illegible]	[illegible]	[illegible]	—	
[illegible]	[illegible]	[illegible]	[illegible]	—
[illegible]	[illegible]	[illegible]	—	—
[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	—	[illegible]		—

[illegible] ... [illegible]

[illegible] ... old gastro ... [illegible]

[illegible] ... in two year ... [illegible] ... Illcers

[illegible] ... in the Hospital include Dyspepsia [illegible] ... colic appendicitis enteritis constipation [illegible] No ... diseases no dentistry

Such a striking contrast in health standards ... very obvious explanation—something apparent to the naked eye

III.—Genealogy of the Present Day Diseases of Civilization (Tables III and IV.)

The most outstanding changes affecting the health of civilized communities within the last half century concern :—

(a) The dietary of the people (b) the development of power and the reduction of manual labour, and (c) the increase of wages and the higher standard of living

Changes in the Dietary.—Two factors that have led to the greatest modification of our civilized dietary were :—

(1) Sugar refinery, and (2) the introduction of roller milled and devitalized white flour (1880) The consumption of refined sugar has grown steadily in all civilized countries The wealthiest nations are the highest consumers (Table V) Are not the wealthy nations the possessors of the lowest dental standard when one takes into account the ever increasing army of dental surgeons that they are forced to maintain? The same nations probably stand at the opposite pole from the primitive races as regards abdominal health It has been demonstrated that appendicitis causes its highest mortality among the well-to-do Doubtless this applies to nations as a whole as well as to sections of the community Is it not significant also that the only animals which suffer severely from the diseases of civilization are those which are fed from man's table—his pampered pets Very

comm[illegible] of the Royal Veterinary College [illegible] tonsils and ulceration of the stomach. They also suffer from obesity and rheumatism. The introduction of white flour has been an important contributory factor in the aetiology of dental caries. Even the most casual observer could not have failed to note how refined flour and sugar have contributed to the great development of the pastry and confectionery business within the last forty years. It is a development no less conspicuous in the Navy than in the civil community.

Increase of the Sedentary Habit.—One of the crazes of modern civilization is to reduce manual labour to a minimum. The development of steam and other sources of power has led to a remarkable diminution of manual labour and to an increase of sedentary occupation; this applies to the Navy as well as to the general community. Look at the development of mechanical transport.

TABLE III.—DIET AND DISEASE IN THE NAVY

(Extracts from a paper by Surgeon Commander Dawe, Naval Health Officer.)

A.—*Changing Disease Picture.* Increase in the surgical diseases of the digestive tract when most other diseases are on the decline.

In the ten-year period, 1914-23, the following changes are recorded:—

Appendicitis	Incidence more than doubled
Gastric Ulcer	2½ times increased[1]
Duodenal Ulcer	3½ times increased[1]

[1] Despite the lives saved by surgery, mortality from these diseases is increasing rapidly in the civil community.

Not only are these diseases on the increase but there is a steady increase in the perforating type of ulcer with higher fatality. The same change is found in the statistics of the military forces.

B.—*Changing Habits and Dietary.*

Habits.—Work to the modern man of war less conducive to *all round* physical fitness than in the days of sails and boat pulling. Increase of specialized and sedentary occupations between decks. Influence of oil fuel and electricity, &c.

Dietary.—A much fuller dietary amplified from the canteen. Remarkable increase in the consumption of the products of refined sugar and refined white flour, pastry and confectionery. Remarkable reduction in the consumption of alcohol. Higher wages and more money to spend on food.

TABLE IV.—A. SOME POINTS IN THE HISTORY OF THE SURGICAL DISEASES OF THE DIGESTIVE TRACT, INCLUDING DENTAL DISEASE, IN CIVIL COMMUNITY.

(1) They represent a group of diseases that have come into prominence during the last half century. Therefore the causes to which they owe their origin have arisen within the half century also.

(2) Despite [illegible] death rate from [illegible] still [illegible] becoming more [illegible] spread [illegible].

(3) [illegible] all classes of [illegible] are affected [illegible] to the [illegible].

(4) With [illegible] to the [illegible] supplies with capital [illegible] [illegible] the [illegible] naval surgeons [illegible] prevalent [illegible] increasing [illegible].

(5) [illegible] thus [illegible] dental disease [illegible] is a [illegible] upon [illegible] the only [illegible] of the [illegible].

B. [illegible] *Dietary* are of [illegible] the bluejacket [illegible] —

[illegible] in sugar consumption (Table V), the introduction [illegible] white flour [illegible] the [illegible] development of [illegible].

[illegible] occupation [illegible] the great [illegible] devices of mechanical [illegible] mechanical [illegible].

[illegible] higher standard of living, and the amount of money spent on food.

[illegible] *Wages*.—Increasing prosperity has led to the spending of [illegible] and more money on victuals. Although the standard naval ration [illegible] ample and varied one, the large profits of the Army and Navy Canteen [illegible] are convincing evidence that it is far from sufficient to satisfy the [illegible] of the bluejacket. There is increasing evidence to show that [illegible] disability is caused today through over-eating than from excessive [illegible], and that "saccharism" has become a pathological entity that is [illegible] taking the place of alcoholism.

IV.—Pathology of Saccharism (Tables I and II)

There must be some definite explanation of the pathological contrast [illegible] in Tables I and II as between East and West. If it had been [illegible] to replace the sickness rates of the general civil community by [illegible] of the bluejacket the contrast would have been still more remarkable. There is justification for the belief based on the study of the history and aetiology of civilized diseases, that we have here a new pathological entity "saccharism." One might define saccharism as the "sequelae of over-nutrition combined with deranged metabolism resulting from insufficient physical exercise." Probably the most important single item in over-nutrition is refined sugar.

The rate of sugar consumption would appear to be an index of wealth. Up till the [illegible] war this country had a higher consumption than any other. Since then America has gone far ahead. The increase has been accentuated by prohibition.

(1) *Diabetes Mortality in Relation to Increased Consumption of Refined Sugar* (Tables V and VI).—That the relation between diabetes and sugar consumption is an intimate one is indicated by (a) The remarkable fall [illegible] diabetes mortality in this country during the war following sugar restric-

[illegible] remarkable [illegible] Americans that [illegible] [illegible] of sugar since prohibition [illegible] sumption of sugar per head [illegible] habit (Rossman)

TABLE V.—ANNUAL RATE OF C[illegible] IN GREAT BRITAIN AND IN THE UNITED STATES [illegible]

Year		
1860	34 11 [illegible]	[illegible]
1861—70	[illegible]	[illegible]
1871—80	[illegible]	[illegible]
1881—90	71 [illegible]	[illegible]
1891—1900	81 [illegible]	[illegible]
1901—10	83 [illegible]	[illegible]
1911—20	War rest[illegible]	[illegible]
1921—25	7[illegible] 11	[illegible]
1926	87 10	[illegible]

[illegible]

TABLE VI.—DIABETES MORTALITY RATE [illegible] SUGAR CONS[illegible]

Decennium	Males	[illegible]	[illegible]	
1861—70	13	[illegible]	[illegible]	
1871—80	54	[illegible]	[illegible]	
1881—90	71	[illegible]	[illegible]	(1[illegible])
1891—1900	90	[illegible]	[illegible]	(1900)
1901—10	101	[illegible]	[illegible]	
1911—20	War restricted		[illegible]	
1921—25	105	[illegible]	[illegible]	(1923)

(a) War restrictions [illegible] by a rapid rise [illegible] females were 10[illegible] and [illegible] 131 [illegible] for females [illegible] 1926 [illegible]

The drop [illegible] —

	1913	[illegible]		
Males	[illegible]	130	[illegible]	[illegible]
Females	130			

Since the war there [illegible] a rapid [illegible]

	1918	1920	[illegible]	[illegible]	[illegible]
Males	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Females	91	111	[illegible]	[illegible]	[illegible]

[illegible] increase in mortality [illegible] of age and upward

TABLE VII [illegible] IN THE [illegible]

[illegible]

(1) [illegible] dental caries and obesity

(2) [illegible]

[illegible]

[illegible] In the first place it [illegible] Secondly there is [illegible] the changing clinical picture [illegible]

[illegible] are no less serious than [illegible]

[illegible] dental and medical, as the [illegible] sweet eating [illegible] flour It has both a [illegible] direct action

Direct —In the [illegible] growth in the mouth

Indirect —When [illegible] intestinal disturbance it interferes with the [illegible] of bone forming substances In this manner it is also a [illegible] the causation of rickets (Mann)

(4) As a cause of [illegible] metabolism and obesity it is in part responsible for the pathological sequelæ of obesity Diabetes gout nephritis gravel chronic [illegible] arteriosclerosis myocardial disease

(5) It is suggested that the excessive use of sweets and pastries has not yet been fully appreciated as the direct cause of a considerable mass of digestive disturbance Attention is directed from time to time in current medical literature to the increasing prevalence of flatulent dyspepsia in later life We can at least [illegible] that the charge is suggestive if not proven

(2) *Effect on Metabolism of Over Nutrition Combined with Insufficient Physical Exercise* —The over nourished body is comparable to the banked fire with dampers closed down Lack of physical exercise means deficient aeration incomplete combustion and the accumulation of the unburnt products of metabolism which slowly drug and poison the system This harmful influence is accentuated by the fact that the eliminatory function of the skin is not called into action

As the result of considerable personal observation and experiment (Section VI) I have convinced myself that this condition—which might be described as "metabolic stasis," is not only a reality but a very common pathological entity There is reason to believe from the pathology of diabetes that metabolic stasis would explain the origin of "lowered resistance to infection" which is so characteristic a feature of civilized pathology to day As a cause of depressed cell vitality it might also prove to be the predisposing cause of irregular cell growth and malignant neoplasm

Furthermore exercise is also necessary for healthy muscle metabolism There is undoubtedly some connection between the chronic rheumatisms and the sedentary habit Regularity of the bowels is to some extent dependent upon the health tone of the abdominal muscles Is the prevalence of hernia not a sequel to weakness of the abdominal muscles?

In Nature there is only one standard of fitness "fighting fit" The

[illegible] labourer who leads the simple life and lives by the sweat of his brow [illegible] near to that standard When we take Nature as our standard [illegible] at once apparent how far we have fallen from grace?

(B) Vitamin Deficiency.—Here we have further evidence of the effect of the refinements of our civilized dietary accentuated by the abuse of cooking Probably the lack of vitamins is one of the factors that predispose to over-eating, and it has been demonstrated that over eating accentuates vitamin deficiency Surely the remedy is a simple and obvious one not one that calls for further experiment with concentrated extracts

With this foundation the pathology of the disease picture in the bluejacket, representing civilization, is summarized tentatively as follows —

(A) *Defects of Metabolic Origin* —(*a*) Defective structure of the teeth Gastro intestinal disturbance due to sweet-eating interferes with the absorption of the bone forming substances (Van der Bogert, School Social Services) Mann is of the opinion that the same factor is concerned in the ætiology of rickets (*b*) Weakness of the tonsillar and adenoid tissues —a predisposition to hypertrophy and infection (*c*) Natural defensive mechanism of the blood defective—susceptibility to infection, local and general (*d*) Deranged sugar metabolism—diabetes and obesity (*e*) Deranged muscle metabolism and chronic rheumatism

(B) *Diseases of the Digestive System* —

(1) The evidence of wear and tear of the whole tract suggests overwork

(2) Dental caries due to the sticky and fermentable character of the refined carbohydrates combined with their power to form acid which dissolves the enamel The structurally defective dentine is then exposed Sepsis both local and general, is a later development

(3) Diseases of the tonsils and adenoids appear to be of increasing frequency Local disease is a common antecedent of systemic infection *e g* rheumatic fever tubercle &c

(4) Diseases of stomach and duodenum gastritis gastric and duodenal ulcer and later cancer, suggest the presence of some irritating quality in the food It must be something in common use by all classes

(5) Appendicitis in which a friendly organism suddenly becomes pathogenic is evidence of lowered vitality There is some analogy between infection of the appendix and infection of the tonsillar and adenoid tissues

(6) Intestinal stasis ulceration of the colon, hæmorrhoids and cancer of the lower bowel indicate mechanical difficulties and irritation due to the excessive food mass Possibly vitamin deficiency is a secondary factor

(7) The liver and pancreas also show evidence of stress *e g* jaundice, gall stones sepsis, cancer &c

months ago that has proved most instructive. At the time (early November 1927) I was undergoing a course of study in London and although suffering from no obvious disability I had distinctly fallen from my Singapore standard of fitness. I felt tired and drowsy in the evenings and was unable to concentrate on any mental work. My daily studies left me little time for taking exercise, and I had lost to a great extent the inclination to take exercise. The only definite sign of functional disturbance was a heavy uratic deposit in the urine. A gain of weight convinced me that the error lay in my dietary. By dint of habit I had omitted to strike a balance between fuel consumption and work done. From this date I commenced to experiment.

By degrees I reduced the bulk of my daily ration to about half—represented by a difference of expenditure down to was from about 4s a day to nil or nothing at all. In time I cut out all sweet stuffs, pastries and beef. I discovered moreover that I could omit any meal in the day without appreciating its loss. Within three months I got back to my Singapore weight.

Other observations might be enumerated briefly as follows: (1) A rapid return of mental energy. I have been working at high pressure early and late ever since. (2) Improved physical condition—renewed keenness on exercise and a great improvement in wind. Running is now part of my daily recreation and I run a mile regularly in addition to any other exercise taken. I regard the run not merely as an aid to fitness but as a test of physical efficiency. Incidentally the disappearance of urates from the urine occurred within a week of diet restriction. (3) Less susceptibility to cold and chill. Despite the cold snaps I found it unnecessary to put on winter underwear for the first time in over twelve years. Although very susceptible to colds I only contracted one in six months and that was at the end of four and a half months when I had begun to diet less rigidly. (4) Since cutting out the sweet stuffs I no longer suffer from fullness and flatulence after meals. (5) Lastly I set myself an endurance test. During leave in the Isle of Wight recently I started off one morning from Sandown to see how far I could walk in the day. I walked the island from east to west and back covering over 40 miles in ten and three quarter hours and returned none the worse other than comfortably tired. Some nineteen years ago I set myself a similar test but on that occasion I had walked myself to a standstill in 31 miles. I then finished up not only footsore but stiff in every joint and was unable to put on shoes for three days.

As a result of these observations on personal health I am forced to the belief that my complaint must be a common one particularly at ages of 40 and upwards and moreover that "metabolic stasis" explains the origin of my original symptoms at the commencement of the experiment.

VII. A [illegible] NATIONAL H[illegible]

[illegible] apparent [illegible] standard [illegible] revision.[1] [illegible] increased expectation of life there is [illegible] evidence of physical deterioration and of an increase of invalidity in the community as a whole. This is further borne out by the fact that out of some 3000 odd applicants at a Recruiting Depot for service in the Navy 1926–27 only 30 per cent. attained the required standard. In selecting our labour recruits in Singapore there is no evidence of such mass disability. Moreover, these standards which are taken as evidence of improving health are open to serious criticism. The most important cause of the declining death-rate and increased expectation of life is the decline by over 50 per cent. in the birth-rate. Credit must be given for the remarkable improvement in infant health that has been achieved within the present century as the result of improved infant feeding. That scourge of infant life, infantile diarrhoea, has been practically eliminated, and with it—a development also of the present century—a remarkable decline in morbidity and mortality from infantile tuberculosis at ages 1–5. There has also been a considerable reduction in mortality from all causes at the same age period, 1–5. No improvement at all comparable to this can be claimed for any other age period. While this improvement in infant health is responsible for a considerable drop in the death-rate and an increased expectation of life, the fact remains that if we had to-day the birth-rate of 1870 we should be having an annual increment of some 1,200,000 births instead of the present 600,000. Even with an infant mortality rate of 140 per annum—double the present rate—and even after making a further allowance for the lives saved at ages 1–5, we should still have a surplus of lives many times greater than the number saved yearly by improved infant care. Decline in the birth-rate is a factor over which preventive medicine can exercise no direct influence. It is evidence of economic stress, but if a fraction of the money spent on preventable disease could be turned to profit-bearing ends, it would do much to overcome the cause of the declining birth-rate. It is significant that New Zealand has the highest birth-rate of any part of the Empire, and at the same time the lowest death-rate and infant mortality-rate.

In conclusion, is it not a fact that surgery and dentistry play no small part in maintaining our low death-rate. Surely the standard to aim at is something better than this, when we can keep fit without recourse to surgery and dentistry like our Eastern races. Furthermore, as the only general reliable records of sickness, it is contended that the study of service records would enable closer touch to be maintained with the trend of sickness in the community than through death statistics. The mortuary represents the end products of disease. It is the most difficult end from which to start in tracing back the origin of disease.

VIII.—Conclusions

In summing up the following are the conclusions [illegible]—

(1) Despite the wonderful achievements on the [illegible] side of [illegible] during the last century—in pathology [illegible] surgery, [illegible] &c.—the advance to be recorded on the part of [illegible], namely, curative medicine, is practically negligible by comparison. Even the much discussed insulin—despite its usefulness—has failed to come up to expectations as a cure for diabetes.

(2) In order to cure as well as to prevent disease it is essential to possess a thorough knowledge of the underlying causes of disease. Through a failure to keep touch with the changing conditions of civilization the causes of the diseases in the ascendant to-day have long been overlooked.

(3) The urgent problems of national health to-day have already passed beyond the range of the curative method. Moreover prevention where practicable, has always the advantage of an absence of pathological sequelæ which are so often a sequel to cured disease.

(4) There is no apparent reason why the prevention of the diseases of civilization should be any more impracticable than the prevention of malaria or yellow fever.

(5) There is considerable evidence to show that the bulk of the diseases prevalent to-day are due to preventable causes that can, even in the present state of our knowledge, be alleviated by more rational dietary. Although we are not yet in a position to lay down rules for a health diet, there are so many defects in our present regime that their correction must be attended with far-reaching results. When these defects have been made good we should then be ready, after a further survey of the situation, to plan our next move with more precision.

(6) The situation demands convincing health advice by broadcasting. The public awaits such a step from the medical profession.

(7) Lastly, is it not apparent that the best results are to be achieved by a judicious combination of the scientific with the practical side of medical practice? We have learnt in the Navy that what the Navy needs most is 'fighting material,' not "clinical material." Are not these also the needs of the Nation? Should it not be the first duty of the medical profession, service or civil, to cater for these needs? The diseases of pampered pets suggest a useful line of investigation because they supply evidence that the lower animal is susceptible to the train of disease sequelæ peculiar to civilized man. Let us reproduce these civilized conditions for the purposes of animal experimentation on a large scale, and let us provide as a control primitive natural conditions for the other side of the picture. The experiment should not only prove that health in the lower animal is no less dependent upon natural conditions than is health in the super-animal—man, but it should also throw light on the important relation between heredity and disease.

While a problem of this magnitude awaits solution let it not be said

that the [illegible] service is lacking in professional opportunity! It has been [illegible] this paper to demonstrate that although professional opportunity [illegible] animal experiment on a large scale, no service could be [illegible] for the study of the difficult problems of the ætiology and [illegible] disease

TABLE VIII.—H[illegible] CANCER MORTALITY IN ENGLAND AND WALES

Death rates per million [illegible] for malignant disease, all forms, including the sarcomata, since 1850 —

1851—1860	317	
1861—1870	386	
1871—1880	470	
1881—1890	591	All age groups affected increase greatest—55 65, 65 75
1891—1900	759	
1901—1910	904	
1911—1920	1 117	
1921—1925	1 269	

The annual increase from 1906—26 for both sexes at rates per million living was as follows giving every fifth year —

	1906	1911	1916	1921	1926
Males	798	891	1,163	1 142	1 307
Females	1,038	1,086	1,168	1 281	1 413

Even after making due allowance for improved diagnosis there can be little doubt about the rapid increase of mortality In America the increase has been more pronounced in cancers of exposed sites in the proportion of 85 per cent to 19 per cent of concealed sites

If the much vaunted increased expectation of life were a healthy one we should have no cancer problem

Does not the same formula already applied to diabetes dental disease surgical diseases of the digestive system, &c., apply equally to cancer

The causes underlying the incidence of cancer have come into existence within the last half century and are of ever increasing intensity

TABLE IX.—COMMONLY ACCEPTED FACTS WITH REGARD TO CANCER INCIDENCE THROUGHOUT THE WORLD

(1) Cancer is comparatively rare in primitive races

(2) Site incidence (referring to body not place) is a very characteristic feature of carcinoma throughout the world (See illustrations in text)

(3) Intestinal cancer is the rarest type of cancer when it does occur among primitive unwesternized races among whom the standard of abdominal health is high

(4) Where tropical and other eastern races come into contact with western civilization and adopt western habits of dietary they become subject to the diseases of the westerner appendicitis, cancer, &c as illustrated in the American Indian, American negro, Straits Chinaman the Maori, &c

IX.—ADDITIONAL NOTE ON THE ÆTIOLOGY OF CANCER

Cancer is not an important cause of disability in the Navy only because the age of distribution of personnel is unfavourable, and this paper would be incomplete without some reference to the ætiology of this disease

Cancer fits into our disease picture like the piece of a jig-saw puzzle. Sarcoma, which is evidently a distinct entity aetiologically, comes under a different category. Sarcoma has a different age distribution; it is not increasing at the same rate; it may involve healthy or diseased tissues and is often a sequel to injury.

The outstanding feature in cancer incidence is *the history of antecedents*. It only affects tissues or organs damaged by previous irritation or disease. The crux of the etiology of cancer is the explanation of the increasing predisposition to the disease in civilized communities. I have already suggested that we may have in "metabolic stasis" the cause underlying "lowered resistance to infection"; this same factor might equally be responsible for "depressed cell vitality," irregular cell growth and neoplasm. The primary exciting causes which determine cancer incidents are therefore the causes underlying its antecedents.

Table VIII gives the history of cancer mortality in England and Wales.

Table IX gives the facts more or less generally accepted in regard to the incidence throughout the world; and Table X gives a comparison between cancer incidence in Calcutta and in London. The following illustrations help to explain the facts contained in these tables and to further emphasize the importance of antecedents in cancer causation:—

(i) Primary cancer of liver is met with in Africa, China, Japan (also the Dutch East Indies). In at least three of these countries it is invariably associated with cirrhosis and schistosome infection. (Antecedents not defined in Dutch East Indies.)

(ii) Primary cancer of liver is met with in India, associated with cirrhosis and dysentery. Cancer of the large bowel, as a sequel of dysenteric ulceration, is relatively more common in Calcutta than cancer of other parts of the digestive tract.

(iii) Cancer of the penis occurs in native races, associated with phimosis and calcareous concretions.

(iv) Appendicitis is twelve times more common in British troops serving in India than it is in native troops. It is significant that cancer of the stomach is twelve times more common in London than it is in Calcutta.

(v) Cancer of the skin is more common in Calcutta than it is in London. The bare legs of the native are more exposed to injury and ulceration.

(vi) Cancer of the mouth occurs equally in both sexes among eastern races who are all equally addicted to the habit of chewing betel nut.

(vii) As a final illustration, Table XI demonstrates that the brunt of cancer incidence in the Navy falls upon the disease scarred digestive tract—applies equally to the civil male community. In the female sex, the antecedents of cancer are to be found in the hospital records of both in patients and out patients of our civilian hospitals. Sepsis associated with or following maternity is a conspicuous feature in these antecedents.

TABLE X.—CANCER INCIDENCE IN CALCUTTA [illegible] WITH LONDON

(*[illegible] lecture [illegible] Sir Leonard [illegible] records.*)

Although the Indian in Calcutta [illegible] has been in contact with western civilisation for upwards of [illegible] while the Tamil is of [illegible] stock, it is interesting to compare the [illegible] below with those of [illegible] labourer given in Tables I and II [illegible] the antecedents of cancer. (See illustrations [illegible])

Disease	[illegible]	London [illegible]
Gastric and duodenal ulcer	[illegible]	[illegible]
Gastric cancer	[illegible]	10
Cancer, large intestine	[illegible]	13
Cancer, liver and gall bladder	[illegible]	3
Cancer, skin	[illegible]	3[illegible]
Cancer, penis	[illegible]	7

[illegible] remarks that this [illegible] London [illegible] the large number of operations and [illegible] and (2) the [illegible] appear in the surgical post mortem [illegible] included although [illegible]

The most recent information from India [illegible] of the stomach is [illegible] unknown in 126 districts and [illegible] in which it is common [illegible] populous province of Madras.—[illegible] November 20, 1927 [illegible]

TABLE XI.—SITE DISTRIBUTION OF CARCINOMA IN THE NAVY

An analysis of the site distribution of thirty two cases occurring in the three years 1922–24. Although the numbers are few they are fairly representative of cancer distribution in the civil community. *Over 8[illegible] per cent affect some part of the digestive tract.* (Sarcomata excluded.)

Analysis according to site

Organ or part	Case No
Lip, mouth, palate, jaw, tonsil	5 (1 each)
Œsophagus	2
Stomach	8
Intestine (colon 2)	5
Rectum	4
Liver	1
Pancreas	2
Total digestive	27
Kidney	1
Testis	1
Neck and glands	2
Rodent ulcer	1
Grand total	32

[illegible] seven cases of sarcoma—roughly 18 per cent of the total—not a [illegible] proportion when the age distribution of the personnel is considered.

It is interesting to compare the site distribution of cancer in the bluejacket with the [illegible] bution of disease of the digestive tract—illustrated in Table II.

It illustrates the importance of antecedence in cancer ætiology.

N [illegible] to the International Cancer Congress held in London [illegible]

[illegible] the [illegible] national [illegible] papers read at the meeting. No reason was [illegible] in regard to the general [illegible] of [illegible] point of view were (1) That of [illegible] that the causative agent [illegible] cancer is [illegible] of the nature of an enzyme, and (2) [illegible] particularly those of [illegible] (paraffin wo[illegible] and Southam (mule spinners cancer)

For the discussion [illegible] that there are quite a large number of extensive [illegible] the cancer diathesis, their [illegible] would appear to [illegible] of Murphy. Several interesting facts are illustrated [illegible] to apply to [illegible] a whole.

(1) *Long Incubation* [illegible] even up to forty years

(2) *Long Exposure* [illegible] *Essential Irritation*—Eighteen to forty years

(3) *Importance* [illegible] and upwards

(4) *Important* [illegible] followed by a chronic stage then warts and [illegible] finally ending in ulceration and malignancy [illegible] to forty years

(5) *The* [illegible] stage of malignancy is reached the cancer diathesis [illegible] of one malignant tumour is [illegible] followed by [illegible] the wart breaks down and becomes cancerous [illegible] have been removed successively from one patient [illegible] cancer

(6) Last, but not least [illegible] equally exposed to the same risk only a small proportion [illegible] the cancer diathesis

It would appear that all the [illegible] common to cancer cases in general I suggest [illegible] which determines the presence or absence of a resistance to [illegible] depends up in the physical condition of the individual For [illegible] favourable to longevity—[illegible] and agricultural labourers [illegible] of cancer mortality whereas in the short lived occupations such as [illegible] cancer mortality is many times higher

This evidence tends to confirm the conclusions already arrived at in my thesis

Over nutrition and Cancer Hoffmann (Prudential Assurance Company America).

(Extract from a lecture delivered at the Royal Institute of Public Health)

I feel that the dietary aspect of the cancer problem has not received the attention to which it is entitled General studies of the profound dietary changes in modern populations during the last generation conclusively prove that we no longer eat in quantity or quality as was the custom of say thirty years ago and that the effects of the dietary changes are unquestionably one of the direct contributory causes accounting for the alarming increase in cancer frequency during the last half century The change has been both quantitative and qualitative The enrichment of modern civilized populations in the

lirectio[illegible] f [illegible] l[illegible]ger spending power for food have led practically everywhere t[illegible] tion of foodstuffs more or less incompatible with normal [illegible]. We not only eat too much but too often. The continuous resulting irritation of the gastric and intestinal organs may safely be looked upon as the predisposing factor in cancer causation

The fact that this quotation was found in a lay journal is an indication of the trend of public opinion in regard to the cancer scourge

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SOME ASPECTS OF THE EPIDEMIOLOGY OF TYPHOID FEVER IN THE ROYAL NAVY[1]

By Surgeon Commander SHELDON F DUDLEY, O.B.E. M.D. M.R.C.P. D.P.H. D.T.M. R.N.

It is as well to begin by explaining exactly what I mean by the adjective typhoid The names of certain diseases are often used in two distinct senses depending on the definition employed A patient, irrespective of any presumed biological agent may be labelled as suffering from a certain illness provided he shows certain signs and symptoms, or the clinical syndrome may be considered of minor importance and the name of the illness decided by the organism which is presumed to cause it Unfortunately there is no convention as to which nomenclature should be used, prejudice, custom, or the prominence of certain organs or symptoms in the clinical picture decides the question one way as often as the other Typhoid fever is a good example of a medical term which has been given various meanings at different times When I learnt " fevers, typhoid had of course been differentiated from typhus fever, but some other fevers had yet not been separated from typhoid I was taught that any long continued fever which obviously was not something else, such as tuberculosis or malaria, should be called typhoid fever Thus typhoid fever became a sort of pigeon hole in which was placed all that group of fevers which, at a later date in the Army were more cautiously and honestly, labelled as P U O Advances in bacteriology showed that many cases, which could be diagnosed as typhoid fever under the most stringent of clinical definitions, were caused by organisms which the systematic biologist would refuse to classify as *B typhosus* These organisms were *B paratyphosus* A and B After the recognition of these organisms it became a habit to limit the adjective typhoid to those fevers caused by *B typhosus* and because the fevers due to *B typhosus* and those caused by paratyphoid bacilli, were often clinically indistinguishable, the term enteric fever was used to

[1] Paper read at the Royal Society of Medicine (War Section) February 13 1928 Reprinted by kind permission from the *Proceedings of the Royal Society of Medicine*, vol xx No 5 March 1928

include the whole group. Further advances in medicine showed that during the prevalence of typhoid there were many cases with mild symptoms which no physician of a former generation would have diagnosed as typhoid, but which were undoubtedly due to infection with *B. typhosus*. Therefore it is possible to have on the one hand clinically identical fevers due to separate species of bacteria, and on the other hand conditions clinically different, although due to the same biological agent. For this reason it became the custom to reserve the term typhoid fever for all fevers considered to be caused by *B. typhosus* irrespective of the clinical picture. Even this definition is not as simple as it sounds, because I have seen cases of suppurative cholecystitis, or periostitis, with no history of clinical typhoid fever, in which the pus from the gall-bladder or bone sinus, contained *B. typhosus* in pure culture. Such cases can scarcely be called typhoid fever without qualification, because the gall-bladder, or bone lesions, dominate the situation. In enteric fevers all orders of severity can be found, from the mild ambulant case, scarcely ill, up to the toxæmic rapidly fatal case. This is so striking that a thoughtful observer might wonder if there was a type of typhoid fever milder than the mildest ambulant case, *i.e.*, a case without fever or any other symptoms. This type of case has been found, but of course can only be recognized for certain by the discovery of *B. typhosus* in the excreta. As it would be unconventional to call such non-symptomatic cases typhoid fever, custom has christened them "contact carriers." The whole carrier problem, however, becomes much simpler if one remembers that the "contact carrier" is merely the limiting case of a clinical condition. A few cases of enteric fever (including "contact carriers") become tolerant to the specific organisms, which may then live for longer or shorter periods within these individuals, which are the chronic and convalescent carriers. Though carriers of enteric fevers may not have symptoms their blood often differs from normal blood in several particulars, especially in the power of agglutinating the causative organisms of the disease they carry.

Here the discussion on the meaning of typhoid fever might drop, but further confusion has arisen by loose usage of "enteric." I think enteric was originally a convenient name for the group of typhoid and paratyphoid infections when it was not required to distinguish them bacteriologically. However, during the war, at a time when a heterogeneous multitude of intestinal infections appeared at the hospitals for diagnosis, all were often loosely termed "enteric." These infections included the dysenteries as well as cases caused by the Salmonella bacteria. The latter bacteria can cause symptoms that nicely fill the clinical gap between ordinary typhoid fever and dysentery. The Salmonella bacteria are a group of organisms closely related to *B. paratyphoid* B., and its species, subspecies, and varieties are so very much alike that they—like the Flexner group of dysentery bacilli—often lead the inexperienced investigator into errors of diagnosis, and further confuse the nomenclature. Luckily, however, *B. typhosus* is

probably one of the easiest of pathogenic bacteria to recognize for it has a distinct serological individuality and other stable and definite characters but these specific characters must be demonstrated before any bacillus is labelled *B typhosus* This is an important point because many who are not practical bacteriologists do not realize the difficulty of isolating and identifying the pathogenic intestinal bacteria If the above difficulties in nomenclature are borne in mind, misunderstanding need not often occur as the context of a paper will generally render clear in what sense an author uses a term like typhoid, enteric dysentery, or gastro enteritis In this paper the adjective typhoid is only used to qualify a condition which is considered to be due to that specific obligatory parasite of man which is usually known as *Bacillus typhosus*

The first outbreak of typhoid fever which I discuss occurred some years ago This epidemic was remarkable for the number of mild cases which were so much in evidence that at first it was thought that the ship was infected with influenza The reason why the outbreak was considered to be wholly one of typhoid fever and neither influenza nor an influenza outbreak running concurrently with one of typhoid fever are —

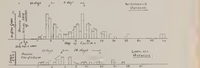
(1) All the medical officers in the hospitals and ships concerned were ultimately convinced that all these patients had typhoid fever

(2) No case gave a negative Widal reaction The positive agglutination results cannot be attributed to previous inoculation with antityphoid vaccine because, of the mild cases twenty-two who had never been inoculated had sera which flocculated *B typhosus* in titres of 1 80 or over

(3) In my experience of influenza in ships it is unknown for an epidemic to last over fifty days, and to attack 10 per cent of the men, and at the same time for all the officers to escape. It is unlikely that the partial isolation of the seventy officers in the ship in question would protect them from a "droplet"-born infection with the characters of influenza, whereas a separate food supply readily accounts for their escape from typhoid

The clinical aspect of these cases is seen in a report on sixty eight of the epidemic cases which were treated in a military hospital Thirty-two were classified as "mild" or "very mild," the rest as "ordinary" or "severe" Among the severe cases seven suffered from intestinal hæmorrhages and two perforated their intestines A fatal case showed characteristic lesions in Peyer's patches In the ship itself thirteen cases were returned to duty within ten days (subsequently these men were sent to a hospital ship for bacteriological examination) Of the ninety seven cases comprising the epidemic, seven died, a case mortality of 7 per cent, which is low for typhoid fever The chief characteristic of the epidemic seems to have been the mildness of about half the cases Some patients treated in the ship only had a rise of temperature for two or three days On the other hand, severe and fatal cases were scattered throughout the whole epidemic period The gradation in the severity is an interesting clinical observation The mildness of the cases cannot be attributed entirely to the previous

inoculation o' about 30 per cent of the patients, because over two thirds of the mild cases gave no history of previous antityphoid vaccination This gradation of symptoms from the ambulant case who feels almost in ordinary health through all degrees of severity up to the fatal case, can be found in many infections, c g gonorrhoea infantile paralysis yellow fever, or influenza An ascending series of orders of severity is more obvious to ships doctors than to their colleagues ashore because in a ship the doctor sees the whole field of an epidemic at once He may have over 1 000 men under his care, and he sees everyone who is not well enough to work (and many more besides) Thus numerous trivial cases come under the naval surgeon s notice, cases which, if ashore, would never have been seen by a doctor Also, when typical clinical cases of an infectious disease are prevalent in a ship it is much easier to suspect and diagnose many atypical



INCIDENCE TYPHOID FEVER IN SHIPS

Fig 1

infections which might have been missed had they been seen one by one in separate houses ashore. The gradual shading off of signs and symptoms down to the mildest of recognizable ambulant cases by itself postulates the case with no symptoms at all In fact, the contact-carrier, i e, the case without symptoms should in this way have been logically deduced by the physician long before he was discovered to be a reality by the bacteriologist

The severity of the typhoid epidemic in question may have been lower than usual But the mildness relative to apparent shore experience was exaggerated, because it is likely if the same cases had been distributed among a dozen practitioners ashore that only the typical and severe cases would have been notified and the fatality would have appeared as 14 per cent instead of 7 per cent

Fig 1 is an incidence histogram of the ninety-seven cases which comprised this outbreak The dotted line is a smoothed curve and shows

that the outbreak consisted of two clearly-defined waves. The first has an acute peak due to the fact that twenty-seven cases occurred in the first week. This explosive onset suggests infection by water or food. After a fall in the number of cases during the second week the curve rises gradually to another definite peak, and then falls still more slowly. The flatter curve suggests that the second wave cases were not directly due to mass infection of food or water, but that certain food supplies were infected at different times by the victims of the first wave.

The incubation period of typhoid is about five to twenty days. The duration of incubation also varies, with the dose of infection, the type of host and the local strain of *B. typhosus*. However, the mean incubation period in this outbreak is indicated by the distance between the two peaks in the incidence curve as being about twelve days. If all of the first wave cases were infected from the same source on the same day, this source should be found about twelve days previous to the first peak of the epidemic, i.e. the original infection was introduced into the ship about eight days before the onset of the first case.

Thus an examination of the incidence curve only suggests that the ship was infected by food or water about a week before the first case fell ill. The water, which was examined on several occasions, more than satisfied the usual chemical and bacteriological tests. No water had been used except distilled water, made on board, or water supplied from a source which had given cause for anxiety neither ashore nor in any other ship. The infection was unlikely to have been contracted outside the ship because twelve out of the first twenty cases had not been ashore for more than a month. The food supplied to the ship was investigated. No shell fish had been eaten, but it was found that thirteen, twelve and six days previous to the onset, uncooked radishes or lettuces had been served. The greenstuffs eaten on the first two occasions were obtained from a source used by all the ships on the station without apparent harm. But on the last occasion 500 lettuces from another locality were distributed to all the ship's company except the officers. The day this lettuce was eaten was only two days later than the date indicated by the incidence curve as the most likely time for the introduction of the infection. The circumstantial evidence incriminating the lettuces is increased by the escape of the seventy officers, who returned no case of typhoid fever presumably because they ate none of this lettuce. Two other possible causes of the outbreak must be excluded. The ship's company, but again not the officers, were given fried fish about two weeks before the epidemic started. Sir William Hamer [1] has shown that small flat fish which are improperly cleaned, cooked or handled in the fried fish shops can convey *B. typhosus* to the intestines of their consumers. These small fish get infected in the sewage polluted river estuaries they inhabit. In H.M. ships the method of cooking fish was undoubtedly safer than in a fish shop, and also the fish in question were neither small flat, nor from an estuary.

The other possibility is that the food supply was infected by a carrier of *B typhosus* The outbreak however did not follow the usual course of one due to a carrier, where entirely unexplained cases appear at irregular intervals. A bacteriological examination of all likely ratings, made during the epidemic failed to demonstrate any carrier who could have been responsible for the outbreak In my opinion it is almost a certainty that the epidemic was started by the suspected lettuce

Figures showing the effect of previous antityphoid vaccination on the incidence of the disease were obtained from the notes of the cases treated in hospital and from the men's medical history sheets

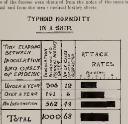


Fig 2

In this table the "no information" figure includes an unknown number of men who had been inoculated during the war and at a time when it was neither customary, nor possible to enter the data of inoculation on a medical history sheet Therefore if the inoculation records had been complete, the "over the year" total would have increased at the expense of the "no information" figure in fig 2 and the ratio of the inoculated to uninoculated attack rates would have been greater than a half But even as the figures stand the difference between the morbidity of the inoculated

and the [illegible] is statistically significant [illegible] the lower incidence in the inoculated group was due to some difference between the two groups, which difference was almost certainly the administration of the T A B vaccine to [illegible].

When it was realized that typhoid fever was epidemic in this ship the whole ship's company were inoculated [illegible] following which the epidemic [illegible]. It was [illegible] most important to notice that before the prophy- [illegible] inoculation could have had any effect the curve of incidence was [illegible] the [illegible] except for two or three cases the epidemic was over.

[illegible] the epidemic had run its course and would have [illegible] without any preventive measures. While I admit the [illegible] which [illegible] towards the end of the epidemic may [illegible] I would warn enthusiasts from seizing on the [illegible] that the [illegible] coincided with the antityphoid inoculation [illegible] the efficiency of T A B vaccine. The [illegible] of symptoms whether in an individual or a herd often coincides with the application of some supposed remedy. The use of "because of" as a synonym for "in spite of" treatment so often seems to escape the notice of patients and medical men that an example of this common fallacy applied to the treatment of epidemics may be instructive.

In 1918 attacks of influenza in ships were usually characterized by an alarming rush of cases followed by an almost sudden cessation. Therefore if there was time for measures to be applied before the epidemic was over the application had to be followed within a day or two at least, by a [illegible] in the daily incidence. A ship's company, of even 1 000 men, cannot produce 100 fresh cases a day indefinitely—a figure actually reached by some battleships during 1918. But human nature being what it is and the doctor liking to feel he has done some good persuades himself (perhaps unconsciously) that the sudden cessation of influenza cases, which must take place in any event, is caused by his prophylactic efforts. The faith of the laity encourages and perpetuates this "post hoc ergo propter hoc" fallacy.

In 1918 I made deliberate use of this fallacy. In H M Hospital Ship *Agadir* I had a large stock of formalin candles. When harassed medical officers from the influenza-stricken fleet came on board asking what to do, with half the crew on the sick list, and the captain beseeching them to stem the plague, I gave them three or four formalin candles, with instructions to burn them with as much ritual as possible and to distribute the candles so as to make everyone in the ship cry. These ceremonial candles always "produced" a satisfactory result as the visitation had to cease within a few days if not at once. Also the crew recovered their nerve for they realized that a "medicine" powerful enough to make them weep [illegible] be too much for any disease germ. The captain of the ship appreciated the skill of the medical officer and all was peace once more.

Although the formaldehyde concentration due to a few candles in the mess deck of a battleship is far too dilute to have any disinfecting effect on the paint work, let alone on a sailor's mucous membrane, yet the psychological effect was not inconsiderable. After all some medical officers whose opinion may be worth as much as mine, swore by these formalin lamps in spite of the fact they were always warned that although this form of incense could not harm the influenza germ, yet it might exorcise the demons of panic and anxiety.

Antityphoid vaccination however, is undoubtedly a sound preventive measure, hence it may not be so easy to see why the termination of the typhoid fever epidemic we have been discussing is not considered to have been due to the coincident antityphoid inoculation of the ship's company. I hope presently to make clear the reason for this opinion. It is important to understand this point, otherwise an incautious supporter of vaccine prophylaxis might arrange the morbidity figures in some way as this: "Before inoculation the attack-rate was twenty seven per week. After inoculation the rate fell to only two per week," which though a fact does not prove that the prophylactic vaccination affected the incidence unless it can be shown that other conditions, e.g. the herd immunity of the population, had remained unchanged throughout the whole period. It is uncorroborated statements such as the example given that anti vaccination fanatics are waiting to pounce on.

The cases of typhoid fever were fairly distributed throughout the different messes. The only living spaces clear from cases were the officers' quarters which occupied the whole of the after part of the ship. Fig. 3 depicts the ship's company grouped as far as possible in the order of their length of service in the Royal Navy.

The chief points of interest in this table are the high morbidity (47 per cent) among volunteers, and the low attack rate (3 per cent) of the boys and ordinary seamen. The volunteers were mostly youths aged from 18 to 20 who had only been a month or two at sea, but with them were a sprinkling of older men, some of whom were over 40 and had served in the war and therefore were well seasoned to naval life. All the volunteers attacked by typhoid fever were youngsters, the older and more experienced escaped altogether. In spite of this the total morbidity of the volunteers was much higher than that of any other group. The boys and ordinary seamen were the next group with the least experience of life in the Navy, they were also the youngest group. Therefore, they might have been expected to have suffered most, but their attack rate was only one sixteenth that of the volunteers and the lowest recorded among those groups who were definitely known to have been infected by *B. typhosus*.

The more senior group of leading and able seamen suffered five times as heavily as the junior group of boys and ordinary seamen. This would have been difficult to explain, presuming both groups encountered the same number of typhoid bacilli had not the medical officer of the ship, in

in his official report on typhoid fever definitely stated that all the boys and ordinary seamen in the ship, to the number of about 130, were inoculated within two months of the onset of the epidemic

TYPHOID MORBIDITY IN A SHIP.

ATTACK RATES ACCORDING TO RANK OR RATING.

Groups or Ratings in Order of Service Experience	Number in Group to nearest 10	Age extent of Group	Average Age of Typhoid Cases	Number of Cases of Typhoid	Morbidity per cent of Group
R.N. Volunteers	30	18-35	19	14	47
Boys and Ordinary Seamen	130	16-20	18	4	3
Able and Leading Seamen	350	20-35	24	55	16
Stokers	150	20-35	24	8	5
Daymen	60	18-30	21	5	8
Marines	150	20-35	26	4	3
Petty Officers	150	25-40	34	7	4
Chief Petty Officers	40	35-45	–	0	0
Officers	70	18-50	–	0	0
Total Ships Company	1130	16-50	–	97	9

Fig. 3.

Elsewhere [2] I have shown that infectious diseases always attack most heavily those groups of the population which have least experience of the environment Therefore it seems legitimate to conclude that the low

morbidity of the ordinary seamen and boys was due to the fact that they were the only group who had been recently and completely inoculated with T.A.B. vaccine, otherwise they should have had a much higher attack-rate. The able and leading seamen had all in their time been boys and ordinary seamen, but none had been inoculated recently and most had not been inoculated at all. Therefore the high attack-rate (16 per cent.) of the poorly protected senior seamen, in contrast to the low attack-rate (3 per cent.) of junior seamen, is a good testimonial to T.A.B. vaccine. It is worth noting that the chief petty officers—the most senior men to partake of the suspected lettuce—were not attacked at all by typhoid fever. The absence of all infection among the officers in spite of the young unseasoned midshipmen amongst them, is attributable to their partial isolation and separate food supply.

For some years I have been labouring the point that in nearly all instances when age seems an important factor in the susceptibility to infection as shown by higher morbidity in the young, the real factor is not age in itself but the amount of previous bacterial experience. This mistake concerning age has arisen because the social class and environment of the majority of the population ashore remain unchanged, and therefore age, on the average, is proportional to the amount of contact in the past between the parasites and the hosts indigenous to the environment. In the crowded life of the Services the bacterial environment is more dense and variable than in any ordinary dwelling ashore. For this reason Service recruits are always more prone than are seasoned men to the attacks of infectious disease.

The seasoning of troops is largely a process of natural vaccination. In the congested conditions of barrack or ship life, men are continually ingesting sub-infective doses of all kinds of pathogenic bacteria or their dead products, and in this way their resistance to many diseases is augmented. In several instances in my own experience I have found contacts of typhoid fever cases whose blood serum agglutinated *B. typhosus* titres of over 1 : 1,000. I at first thought such cases were intermittent carriers, though repeated efforts to obtain the specific bacillus from their excreta failed. I now regard these cases as men who had been in contact with *B. typhosus* but had never developed febrile symptoms. The contact however was sufficient to stimulate production of agglutinins in their blood, and they may, or may not, have been "contact carriers" for a variable time. In addition to such men who have no history of fever but possess detectable specific changes in their blood, Besredka's work on local immunity and the oral administration of vaccines make it not unlikely that during the prevalence of typhoid fever individuals may gain immunity, or enhanced resistance to *B. typhosus*, without even developing specific agglutinins in their blood serum. During an epidemic of typhoid as widespread as that just described one would expect many men to develop immunity without symptoms. Unfortunately circumstances made it impossible to test the

[illegible] ning the agglutination reaction in a large number of inoculated and apparently unattacked men. However there is considerable evidence in the literature that the ingestion of subinfective doses of intestinal bacteria can produce the carrier state, or antibodies in the blood or tissues, i.e., immunity without symptoms. Some examples are: In a Japanese college [4] seventy-seven inmates developed paratyphoid fever; 6 per cent. proved to be passing paratyphoid bacilli, whereas of 159 healthy contact cases 3 per cent. were passing *B. paratyphosus*. The technique of isolation was only successful in 6 per cent. of the cases with symptoms. If we assume that the percentage of success was no greater in the non-symptomatic infections it must mean that about eighty of the healthy contacts were carriers of paratyphoid bacilli.

In 1909 some German soldiers ate a salad prepared by a carrier. Twenty-nine got typhoid fever, but 129, over four times the number of patients, showed contact with *B. typhosus* by developing a positive Widal reaction. These apparently healthy men were nearly all room-mates of the cases [5]. Again Duke [6] has shown that 54 per cent. of the natives of Uganda, owing presumably to their crude sanitation, have sera which will agglutinate one or other of the enteric fever organisms in a dilution of over 1: 50. A last piece of indirect evidence is instructive. In a German province [7] before the war the incidence of paratyphoid was equal in men and women. After the war nearly 40 per cent. more women than men suffered from paratyphoid, yet inoculation against paratyphoid was not practised in the German army and therefore cannot account for the difference in morbidity. The increased herd immunity of the male German seems to me to be due to the adaptation of the male population to the bacterial environment of barrack and trench life by natural autovaccination. It will be interesting to see if the difference between the attack rates of the sexes is wiped out as the years of peace pass by.

For such reasons, when crowded environments such as warships experience a big outbreak of infectious disease, those who escape attack do not always do so because they have avoided contact with the causative parasites, but because the doses of infection they receive are not large enough to overcome their individual resistance. The ingestion of such subinfective doses is Nature's method of vaccination, by means of which many hosts become able to withstand subsequent attacks of much larger numbers of parasites than they could otherwise have done. Professor [illegible] [8] researches on mouse typhoid epidemics clearly prove that the mice which survive an epidemic have not escaped infection, because in no less than 70 per cent. of 207 mice which had survived for various periods after the cessation of an epidemic *B. aertrycke*, the causative organism, was recovered from the spleen. For these reasons I think we are justified in concluding that in our ship epidemic many more than the thirty who were ill with fever in the first wave must have eaten typhoid bacilli with their [illegible], and later many others must have had food or drink contaminated

by earlier cases or contact carriers. Such men were not infected with typhoid fever because they received too few bacilli to overcome whatever natural or specific resistance they already possessed. Instead their specific resistance was augmented by subinfective doses of *B. typhosus* and the herd immunity of the ship as a whole so much increased that typhoid fever could no longer spread. This to my mind is the most probable explanation of the end of this epidemic.

To refer again to fig. 3, it is possible that the high morbidity of the volunteers and the escape of the chief petty officers, the most senior group of lower deck ratings, can be explained by the hypothesis of autovaccination by subinfective doses. The senior group during long residence in the dense naval environment had ingested many kinds of intestinal bacilli, which even if they did not include *B. typhosus*, may have augmented the resistance of their intestines to bacterial attack of any sort. The senior ratings were vaccinated naturally by the bacilli they had swallowed in the past, in an analogous manner to the boys, who gained immunity artificially by contact with dead bacilli out of bottles.

The difference between the incidence of typhoid fever among the able and leading seamen and other ratings of about the same length of service is statistically significant, but I can suggest no very obvious explanation for this anomaly. Perhaps it was due to the distribution of the inoculated individuals, concerning which I have no data, among the different groups of ratings. On the other hand, perhaps the senior seamen ate more than their fair share of lettuce. The distribution of lettuce could, but is unlikely to, have accounted for all the phenomena fig. 4 illustrates, because even if an equal amount of lettuce had been eaten by every man in the ship, it by no means follows *B. typhosus* was equally spread over each of 500 lettuces. Therefore I carefully said the hypothesis of autovaccination by previous bacterial ingestion could but did not necessarily explain some peculiarities in the distribution of cases among the different groups of men in the afflicted ship.

The outbreak indicated that the inoculations performed before the epidemic had limited to some extent the total morbidity. In my opinion the most striking evidence of this was the low attack rate of the boys and ordinary seamen who had been inoculated shortly before the onset of the epidemic, otherwise being the most susceptible group they would have been expected to have suffered most. Although antityphoid inoculation needs no further testimonial, yet naval experience suggests that in order to get its full protective effect the uninoculated members of a community should be reduced to the lowest number possible. Not only because the fewer there are unprotected the fewer will be susceptible to attack, but also because the greater the number unprotected, the greater is the chance that those who have been vaccinated may obtain a dose of infection massive enough to overcome any increase of resistance due to the vaccine. It must always be remembered that the protection against enteric fever conferred by

T.A.B. vaccine [illegible] nearly as absolute [illegible] lasting as the immunity to small-pox given by calf vaccine. The incidence of typhoid fever in the [illegible] in the ship was about [illegible] in the unprotected. This is about the same [illegible] as was seen in the Army during the war. I am not [illegible] [illegible] protective vaccination against either typhoid fever or small-pox. It is very debatable whether either is worth while as a routine among the [illegible] civilian population of a country where the health organization is as advanced as in England, provided power and means are given to health authorities to enforce preventive vaccination immediately circumstances render it advisable. The Royal Navy however gives leave in all sorts of foreign places where sanitation is crude or absent, and many sailors, though warned of the danger, will not realize they cannot eat and drink everything abroad with the same impunity as at home. Also a fighting ship necessarily having one of the densest populations in the world is from this point of view an ideal environment for the spread of infectious disease. Hence a protective vaccine of proved efficiency is a valuable second line of defence to ship sanitation; therefore prophylactic inoculation against enteric fever should be compulsory throughout the fighting Services.

I will now briefly describe a few aspects of an outbreak of typhoid fever [illegible] that ship. These cases present some interesting contrasts with those just described.

The outbreak comprised twenty cases and was entirely confined to the boys and two of the canteen staff. Twelve of the attacked boys sat at the same table. An incidence histogram of this small epidemic is given in fig. 1 under that of the larger one. This diagram is so placed that the onset of the two epidemics corresponds.

From the experience gained in the large epidemic we can imagine this small outbreak also to consist of two waves as indicated by the dotted line. The peaks of this admittedly rather artificial curve are about fourteen days apart. Therefore the infection was probably introduced into the boys' mess about fourteen days before the peak of the first wave, i.e., six days before the onset of the first case. It is interesting to note that this probable date of infection is the same relative to the onset of the epidemic, as that on which the infected lettuce was distributed in the first ship. This is a genuine coincidence. I had drawn the incidence curve for the small outbreak before I thought of superimposing it on the other. In the notes of this small outbreak it is stated that "it appeared certain that the infection was due to a small batch of food partaken of only by the canteen staff and No. 36 mess boys." Unfortunately there is no record of a date on which any such special dish was eaten. The typhoid fever cases in this instance were practically restricted to the boys, one of the least affected groups in the first mentioned epidemic. This was doubtless due to massive infection from a special dish. In the present case the ship's company were efficiently inoculated, which may have prevented secondary cases spreading

been the primary focus of infection. In the larger outbreak the infection was general from the start, as the ship's company, with the exception of the boys, was very poorly protected with antityphoid vaccine. Secondary infections had less difficulty in establishing themselves.

Fig. 4 shows these twenty cases of typhoid fever used to illustrate two other points. A note of the duration of fever in each patient had been kept. In fig. 4 each column represents a case and its height is proportional to the duration of pyrexia. Diagram A, fig. 4, gives the cases arranged from one with no pyrexia up to a patient who had nine weeks of fever. A twenty first boy was added to complete diagram A. This lad had no appreciable illness, but his serum agglutinated *B. typhosus* up to 1: 5,000. He was probably the type of host who acquires immunity during an epidemic without any symptoms of illness.

Diagram B (fig. 4) shows the cases, with duration of fever, in order of incidence, and illustrates a phenomenon often seen in epidemics, i.e. the earlier cases as a whole tend to be more severe than the later ones. The diagram is divided into two groups, twelve supposed to have been primarily infected from the original polluted food, and eight considered to have been infected from these primary cases. The average duration of pyrexia in the primary group is 4.7 weeks, while the secondary group averaged only 2.8 weeks of fever. This phenomenon may depend on a more massive original dose in the primary cases (as may well have happened in the present example) or as sometimes occurs in other infections when some increase of immunity in the later cases of the epidemic is acquired by auto-vaccination during the earlier stages. It may be noted, however, if the above grouping is considered artificial, that it does not matter within limits where the division between early and late cases is made, the latter always show a smaller average duration of fever. In the larger epidemic the data were insufficient to elucidate this point or the phenomenon of apparent diminution of virulence may not have been present on that occasion.

I will now refer to a series of typhoid fever cases in a battleship which show quite a different distribution in time and place from those discussed previously. Between April 1911 and March 1914, H.M.S. *Formidable* had reported twenty eight cases of typhoid fever which arose one or two at a time at irregular intervals. During the last two years of this period several meetings of medical officers were convened to investigate the continued prevalence of typhoid fever in the *Formidable* which was getting more than her fair share of this infection. I was only ordered to attend the last meeting, where I first heard the details of the *Formidable's* history during the previous three years. Many possible causes of typhoid fever, all common to other ships of the Home Fleet which had suffered no unusual typhoid fever incidence, had been considered and practically excluded during the previous two years. Among the suggested causes were polluted water, shell fish, bacilli on the paint work or in the cracks

of the cement floors of the ... mud from the contaminated ... of Sheerness mud brought ... by the cable flies and ... in the baker ... The ... evidence was so clear that when asked for my opinion I ... reply at once. There is a ... of

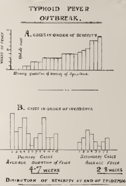


Fig 4.

B. typhosus in the ship who is one of the ratings who joined the ship ... April 1911. Whether I shall be able to find him is another matter ... he is there all the same. Fourteen days later *B. typhosus* was isolated from the stools of one of the fifty ratings who had served in the

ship since April 1911 This man's removal coincided with the cessation of typhoid fever in H M S *Formidable* just as his advent to the ship had coincided with the start of its prevalence "Carrier" was not a household word before the war and none of the senior officers who held the inquiry were bacteriologists Hence they can easily be forgiven for overlooking the fact that the *Formidable* had kept an "invisible case" of typhoid infection permanently on board for three years The full details of this chronic carrier's history were reported at the time [9] It suffices to say now that he had had typhoid fever in 1898, and had served in twelve ships and barracks between that time and joining H M S *Formidable* All these ships returned one or more cases of typhoid fever while this chronic carrier was in them He was a ship's cooper Part of his duties was to open cases of food and to assist in their distribution to the ship's company Thus this carrier had ample opportunities of sometimes infecting articles of food The infections were attributed to the carrier chiefly because they so often occurred in men who had not been ashore for months or even on one occasion, when no leave had been given to any of the ship's company for over a month, and also because by no means could the infection be traced to other common sources such as fish impure water or another case

Sir William Hamer [10] however suggested in one of his illuminating addresses on epidemiology, that I was wrong to attribute these cases to the ship's cooper because for one thing, if the incidence of typhoid fever was the same as that ashore the twenty cases which occurred in the ships in which this man had served previous to H M S *Formidable* might have been expected in the ordinary course of events

From the available exact statistics for typhoid fever in the Navy a simple calculation shows that, for the average population at risk from this carrier the expected number would have been eight or nine less than half the number reported However statistics used in this way are not satisfactory in this case The population at risk was far from homogeneous consisting as it did of different groups of men serving as separate communities in various parts of the world An epidemic like that first discussed could produce fifty years supply of typhoid fever for an average sample of 1 000 men in a couple of months while other ships may easily go for five or more years without returning a case of typhoid fever More striking arithmetical evidence connecting this carrier with the typhoid fever is that *all* the ships without any exception, returned a case or cases of typhoid fever while harbouring this carrier The health returns of the Navy between 1898 and 1910 show that in each year less than one quarter of all sea-going battleships and cruisers return a case of typhoid fever Roughly the problem can be put thus If a man joins a different ship each year for ten years in a navy where only one ship in four per year returns one or more typhoid fever infections, what is the probability of his always selecting by chance a ship that will report a case of typhoid fever during

the year [illegible] The answer is obviously (¼), i.e. the odds are over a million [illegible] against the carrier found in the *Formidable* having no [illegible] with *any* of the cases of typhoid fever which occurred on [illegible] he had served in between 1898 and 1912.

In the same [illegible] mentioned, Sir William Hamer humorously suggests [illegible] carrier responsible for some cases of enteric fever among [illegible] H.M.S. *Euryalus* after a feast of oysters. This [illegible] does not seem so preposterous as at first sight. Oysters [illegible] presumed to become polluted by town sewage, [illegible] fection from [illegible] possible. Just for amusement, let us [illegible] the chances [illegible] anchored off Portsmouth as against [illegible] the town itself [illegible] a local oyster bed. The population of Portsmouth is [illegible] women and children; that of a modern battleship [illegible] 1000 adult men. The town would produce less than 200 times as much human excrement as the ship and probably considerably [illegible] 100 times as many typhoid bacilli as a ship definitely infected [illegible] The town bacilli would run the gauntlet of the sewage [illegible] less than half of them would be alive at the outfalls. [illegible] the town rather than a battleship in the harbour infecting [illegible] are therefore not likely to be more than fifty to one [illegible] of the town. Such odds are often not considered absolutely [illegible] Considered from this point of view the quaint [illegible] the *Formidable's* cooper should have infected the *Euryalus* [illegible] not so far fetched as it might appear. In fact, one begins to [illegible] how far shipping is an important source of estuary pollution seeing [illegible] under favourable conditions of wind, tide and position of ship, [illegible] organisms might arrive on the feeding grounds of fish in better [illegible] and larger numbers than similar organisms which have been [illegible] to the devitalizing effects of crude town sewage.

[illegible] supporters of the carrier hypothesis have been accused of [illegible] the importance of the carrier as a source of typhoid bacilli [illegible] because "cases without symptoms" so easily escape observation [illegible] through sanitary barriers that carriers have any special import- [illegible] it is not until countries have advanced far enough to control [illegible] with symptoms" that the practical sanitarian need concern [illegible] with carriers. In former days typhoid fever was chiefly water [illegible] only when human excreta were kept out of the water supply [illegible] dealing with other sources of *B. typhosus*. After water had [illegible] safe, attention was attracted to certain foods, especially [illegible] vegetables which were likely to get in contact with polluted [illegible] human manure. This source of infection was fairly easy to [illegible] Later, uncooked shellfish were recognized as typhoid "carriers" [illegible] chiefly due to an event in 1902, when 195 of the guests who had [illegible] at two mayoral banquets given on the same day developed [illegible] intestinal symptoms. Twenty of these victims were proved to have

typhoid fever. Because of this disaster oysters were boycotted to a great extent, and measures were taken to render oysters free from typhoid bacilli. The oyster thrives best in not too salt water and flourishes near sewage outfalls. Therefore, oyster beds are generally found in estuaries where the salinity is lowered by the influx of sewage polluted water. The oyster is designed to strain off bacteria contained in the water that continually passes through its gills. A better mechanism for collecting a dangerous dose of parasitic bacilli from a harmless concentration in water and reconveying them to their hosts could scarcely be devised.

All naval medical officers are well acquainted with the shellfish danger as cases often occur at the naval bases and are generally easily traced, for wise sailors do not often get shellfish, and therefore remember the occasions when they do. A characteristic of shellfish infection is that more than one species of pathogenic organism may be concerned. This is to be expected for in sewage contaminated water containing a dangerous amount of typhoid bacilli there are bound to be other noxious organisms as well, and the oyster of course will concentrate other organisms in addition to *B. typhosus*. For example, at the banquets mentioned above, only 30 per cent of the victims were cases of typhoid fever, and in the outbreak in H.M.S. *Euryalus* in 1914 thirty officers ate oysters on one day and twenty eight suffered for it, but only four (14 per cent) developed true typhoid fever. Oysters clean themselves in about a fortnight of dangerous organisms when laid in water known to be free from pollution, therefore they should always be "relaid" in pure water before they are marketed. Fortunately salt water and crude sewage are not favourable environments for *B. typhosus*, which will not survive long in them, otherwise molluscs would be a more dangerous source of enteric microbes than they are. The control of shellfish was hoped to account for most of the residual typhoid in England which remained after water and sewage had come under control, but the result has been disappointing, perhaps because of infection previously referred to, which Sir William Hamer has shown to occur in fried-fish shops.

It is a cynical fact that with great care and trouble we separate our ingesta from our egesta by instituting a safe water supply and a sound conservancy system and having done so, we then mix them again in the river estuaries inhabited by fish and molluscs who strain off microbes from excrement. These animals are caught for food, and bring the microbes they have collected back to the towns from which they came to circulate once more through the human gut, down the drain into the estuary, and back via the fish market to the dining table. Another means by which *B. typhosus* is sometimes carried from host to host is on dust and insects, especially house flies, who live on human food and sometimes breed in human faeces. These sources of infection are important in military campaigns where the proper disposal of excreta is difficult to control.

The study of the relationship between the host species man and his

specific parasite *B.* [illegible] fundamental principle [illegible] application [illegible] concept of [illegible] relations between host and parasite [illegible] In this connection [illegible] recall that the meaning [illegible] is continually changing [illegible] scientific [illegible] an important [illegible] the meaning [illegible] [illegible] *B. typhosus* [illegible] All living [illegible] [illegible] *B. typhosus* [illegible] host in food and water [illegible] transmission as when flies [illegible] typhoid [illegible] to food or when rivers carry infected [illegible] feeding grounds of fish. Such are the means employed by *B. typhosus* to disseminate its progeny throughout the world in [illegible] environments to colonize. Man is the only natural environment [illegible] known) to which *B. typhosus* is adapted and in which [illegible] exist at. The vehicles employed in its dissemination from host to host are literally more carriers of *B. typhosus* than those of its hosts who have no symptoms. Although custom has assigned to the latter the name [illegible] yet it might have been easier to obtain a truer concept of the place of the "germ carrier" in epidemiology had he originally been christened by some other name, such as "tolerant host" or "invisible [illegible]." The problem to the parasite of finding a new host is fundamentally the same whether that host is termed a case or a carrier. If these simple biological principles are continually borne in mind it is easier to envisage the parts played by a fried fish, a bacillus or a ship's cook in the spread of intestinal infections.

I must express my thanks to Lieutenant Colonel W. C. Smales, D.S.O., R.A.M.C., and Surgeon Commander Parker, D.S.C., R.N., for valuable information with which they have assisted me in preparing this paper.

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THE DIFFERENTIAL POLYMORPHONUCLEAR COUNT

By [illegible] WILLIAM J. GERRARD, M.D., [illegible]

[illegible] in 1904 first endeavoured to gauge the [illegible] [illegible] suffering from infections by noting the changes in the [illegible] leucocytes. Since then many workers have introduced [illegible] Arneth's original method with a view to establishing a [illegible] more practical aid to diagnosis, prognosis and treatment. In 1911 W. [illegible] Cooke published an account of a new method of classifying the poly-morphonuclears and confirmed the soundness of Arneth's original [illegible] in which he maintained that in the structure of the nucleus of the polymorphonuclear lay a sure indication as to the degree of toxæmia.

Cooke and Ponder, in 1921 published "The Polynuclear Count," in which there is further confirmation of the value of a close study of the changes in the polymorphonuclear cell.

Diagram to represent the transition from myelocyte to polymorphonuclear

To Piney in *British Journal of Surgery*, 1925, and in "Recent Advances in Hæmatology," we owe the introduction of Schilling's simple and very practical method of grouping of the neutrophile cells. It is necessary to have an accurate knowledge of the leucocyte differential count and of the principles on which the polymorphonuclears are grouped. The writer after considerable experience in polymorphonuclear grouping has adopted the method of differentiation as advocated by Piney. It has been found to be the most practical for the particular object in view, namely an indication for prognosis in infective states. It is necessary to recall the fact that the neutrophile polynuclear leucocyte is developed normally from the myelocyte, a mononuclear cell with a simple round nucleus. The intermediate stage is a cell with a single indented nucleus but without true nuclear lobulation; this cell is referred to as the meta myelocyte. Schilling recognizes two types of meta myelocytes and the grouping of the neutrophilic cells is as follows: Myelocyte, young meta myelocyte with

only slight [illegible] indentation of the [illegible] referred [illegible] old metamyelocyte with deeper nuclear indentation and [illegible] band form and finally the [illegible] polymorphonuclear.

In carrying out the polynuclear count [illegible] type is counted separately and each variety of granular neutrophile cell is expressed as a percentage of the total number of leucocytes. The cells are arranged in order of maturity. Toxic changes cannot prevent the recognition of the type of [illegible] cell. On the other hand there is great difficulty in estimating the [illegible] index in infective conditions where the neutrophile cells show [illegible] alteration of markings and loss of granules.

According to Schilling a normal count is as shown:—

Leucocytes		6 000 to 8 000 per c mm
Polymorphonuclears	61	Total neutrophile granular cells 67 %
Band forms	4	
Young forms or almost t[illegible]		
Eosinophiles	3	
Basophiles	1	
Lymphocytes	23	
Monocytes	6	

It is necessary to remember that there is a transient rise in circulating leucocytes following digestion and muscular exercise. Leucocytes are continually being destroyed in various parts of the body especially in the spleen. Destruction is made good by further production in the formative tissues. Variation in production and destruction of polymorphonuclears is judged by the state of the count. In the leucocytosis after a meal the polynuclears in the blood stream do not come from the marrow but from the reserves in the tissue spaces. There is no simultaneous production of excess of immature forms or shift to the left.

States of disturbed equilibrium in the blood count can be studied experimentally by injecting such a substance as thyroid extract subcutaneously into animals. At first there is increased number of immature cells and there is a subsequent fall as the more mature cells increase in number until the whole count becomes normal again. The immature cells come from the bone marrow. Mature polynuclears are not found in the blood-forming areas. The immature cells become more mature in the blood stream and finally die off.

What are the white cell changes in neutrophilic leucocytosis due to infective states? The changing leucocyte picture due to infection can only be studied by a series of observations in each individual case.

The following is an example of a leucocyte and differential count in a case of boils and septic arthritis of the knee joint:—

Leucocytes		14 000 per c mm
Polynuclears	1	Total neutrophile cells 74 %
Band forms	20	
Young forms	9	
Myelocytes	1	
Monocytes	10	
Lymphocytes	15	
Basophiles	Nil	
Eosinophiles	Nil	

[illegible] of moderate degree. There is an increase of neutrophiles, increase in monocytes, diminution of lymphocytes and absence of eosinophiles. This alone would indicate infection. On more careful examination of the neutrophiles we find increase of immature cells both band and young forms. When these are taken into account there can be no doubt of the diagnosis. The band forms are increased from normal 1 per cent. to 20 per cent. and young forms are 9 per cent. They are normally absent from the peripheral blood. In such a case repeated examinations should be made at short intervals.

In grave cases there is high leucocytosis and a great increase in band and young forms. In infections the production of neutrophilia is a defensive process, and if infection be very severe it is conceivable that defensive mechanism may be paralysed. Leucocytosis will result from increased formation accompanied by excessive destruction of less degree of intensity than production. The result will be an increase in number of immature cells. If destruction of circulating cells is very much greater than production a leucopenia will result, but there will be an increase of immature types from the greater attempt of the marrow to make good the destruction. In the majority of toxic and infective conditions the marrow throws off young neutrophile cells, and if the demand for an excessive number of cells persists hyperplasia of the bone marrow takes place. As infection subsides the neutrophiles gradually fall in number to normal level. The lymphocytes increase well above the normal. Eosinophiles and monocytes usually show an increase during convalescence. In very intense infections accompanied by a reduction in number of leucocytes there is a great increase of band forms and to a less degree of young forms. That is there is a definite "shift to the left." There are however, certain anomalous responses of the hematopoietic tissues to infections. Piney quotes a case of peritonitis with a total leucocyte count below 1,000 per c.mm. The large majority of the cells were lymphocytes. Views on such responses are divergent and explanation difficult.

In infective states, whether we find a leucocytosis or a leucopenia, there is a "shift to the left." Those who decry the value of the leucocyte count as an aid to diagnosis in such a common disease as appendicitis miss the point of real value, because the percentages of the various types of neutrophiles are overlooked. The writer has yet to meet a case of gangrenous appendicitis showing a leucopenia where there has not been a shift to the left in the polynuclear count. The blood findings do not always correspond with the clinical condition. A grave case may show little variation in temperature and pulse even at time of fatal issue, but careful examination of the blood clearly indicates the condition. There will be a persistent increase of immature neutrophiles. During the past two years the writer has carried out hundreds of differential polynuclear counts and confirms their value. In each case 300 cells are counted.

An example of the value of repeated counts in a case of septicemia

following [illegible] quite late [illegible] [illegible]
[illegible] —

October 7—

[illegible]	[illegible]	[illegible]	[illegible]
Small [illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
Lymphocytes	[illegible]	[illegible]	[illegible]
Monocytes	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]

October 13 [illegible]

[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]

[illegible]

[illegible] [illegible]

[illegible] Before operation [illegible] [illegible] 1927 Before operation —

[illegible]	[illegible]	[illegible]	56 [illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	10
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]

[illegible] After operation —

[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]

Death [illegible] the [illegible]

Multiple [illegible] complete [illegible]

In convalescence [illegible] lymphocytosis is found and [illegible] This is found in most chronic infection

Conclusions.—The differential neutrophile [illegible] as indicated is of great value in diagnosis prognosis and treatment It is less tedious than either Arneth's or Cooke's method In [illegible] counts for each individual case lies the value of the method The mildest infections bring about changes in the blood picture and [illegible] study of these taken in conjunction with the clinical history is of greatest value in the diagnosis of catarrhal and gangrenous appendicitis In [illegible] an increasing left hand shift is unfavourable and this point is well illustrated in the examples given

My thanks are due to Surgeon Captain [illegible] and Surgeon [illegible] under Bolton for their co operation and permission to carry out repeated blood counts on patients under their care

To A Piney M D, M R C P Research Scholar The Cancer Hospital, I am deeply indebted He was good enough to check my findings and comment on this paper

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ANATOMICAL TYPES IN RELATION TO SPECIFIC MORBIDITY

By Surgeon Commander W H EDGAR M D

Even since the days of Hippocrates physicians have attempted to account for the disease from which their patients were suffering by attributing it to his type, constitution or diathesis

This attitude brought no consolation to the patient, though it may possibly have done so to the physician, since who could blame him for his patient's constitution? And though to day we do not class our patients as choleric melancholic sanguine or phlegmatic, there is a growing tendency to classify them into anatomical types If the matter began and ended there only academic interests would be served But unfortunately this is not the case for these classifications are introducing us to the science of *specific morbidity* which enables us to predict from a patient's *type* what diseases he is likely to suffer from during his lifetime The subject thus becomes of great importance in preventive medicine in insurance work and in recruitment

When we turn to the question of anatomical types we find at our disposal a mass of material accumulated by such workers as Treves, Bean Bryant and Goldthwait With quite a pleasing unanimity of opinion they arrive at the conclusion that the human species can be classified anatomically into four types To do this certain "points" as we say in the case of a dog or a horse are concentrated on to enable the classification to be made Many of these points require examination by such special methods as *x* rays but a very accurate classification can be arrived at by an ordinary medical examination

In outlining the points in this article the ordinary points are first mentioned those requiring special examinations being inserted to complete the picture

Firstly there is the normal type, and it may be mentioned here that stature has nothing to do with these classifications

Normal Type —The posture is upright and the normal spinal curves are mild and give a vertical mean to the spinal column The shoulders are well set on the thorax and are neither sloping nor unduly square while the neck is proportionate and rounded by muscles and soft tissues The

thorax is [illegible] expansion, and the subcostal angle [illegible] approximating to a right angle. This is an important [illegible] and often gives the clue to the type. The [illegible] is rounded in its upper part and flat in its lower owing to the good tone of the abdominal muscles. The lungs ascend up to the clavicles.

It will be realized that all these points may be found in individuals of very different builds, that is to say the subject may be tall or short, fat or lean, but a harmony of proportion must necessarily be present in a normal type.

The next type is the asthenic, splanchnoptotic, carnivorous or narrow back as variously named. Perhaps the best name is the industrial one, *the narrow back*, and will be used throughout this article, but the carnivorous nomenclature deserves explanation in passing. It was suggested owing to the fact that the individuals of this type approximate to the carnivora—the cat and tiger—in their litheness and agility, as contrasted with the next type to be described, who rather resemble the herbivorous cow or elephant in their physical attributes. The title thus has no reference to the dietetic proclivities of the types.

In the *narrow backed type* the posture tends to be stooping, owing to the accentuation of the vertebral curves, the shoulders are sloping, and the neck is long and thin. The thorax is long and narrow—flat-chested in fact, while the expansion is usually poor, and the subcostal angle is less than 70° owing to the droop of the ribs. The abdomen is flat and dips under the ribs, and the lungs ascend to above the clavicles. The heart is found to be vertical or "hanging," and the stomach is low and atonic, hence the suggested name of splanchnoptotic for this type. On the whole this is not a robust physical type, but yet the individuals may be of fair constitution. They are thin and wiry, and are such as would tend to overswing at golf.

The next type is the reverse of the narrow backs and have been called the broad backs—sthenic, or herbivorous type. Here we have the "fine upstanding fellows," broad and beefy, who far from over swinging at golf hardly swing at all, but nevertheless are capable of getting good results from sheer brawn.

The *broad backs* show the following points. The posture is upright, but in later life it is apt to become modified by the development of "pot belly." The shoulders are square and broad, while the neck is short and thick, and the thorax is deep in its antero posterior measurement, inclining to a barrel shape. The subcostal angle is greater than a right angle, owing to the almost horizontal set of the ribs. The abdomen is well rounded and tends in later life to become self assertive, and the lungs do not come up to the clavicles. The heart is of the "round" variety, strong and muscular. The stomach is high, transverse and tonic.

The fourth and last class is the *mixed type*, and is due to the mating of

[illegible] different types but there is a tendency [illegible] one of [illegible] types in the third generation as predominance asserts itself. A word must be said in relation to posture which is the resultant of type and habit. Its importance in the matter of health lies in the way in which it affects the shape of the abdominal cavity.

In the normal posture the shape of the abdominal cavity, when viewed from the lateral aspect, is that of an inverted pear, apex downwards. But when the posture becomes stooping, owing to either a bad spinal position or to laxity of the abdominal muscles, the pear is reversed, so that the apex points upwards—the natural position as far as the fruit is concerned. Such a shape of the abdominal cavity allows of profound changes in the position of the abdominal viscera, and in the circulation, and results in morbid changes in later life such as portal stagnation, hæmorrhoids, and intestinal stasis.

Having thus briefly described the four human types, the subject of specific morbidity can be approached. Is any one type more prone to certain diseases than another?

Although there is still a great deal of research required on this subject, yet we are even now in a position to reply "Yes" to this question. There are many problems in the study of disease to which bacteriology, morbid anatomy, and clinical methods have failed to provide a satisfactory answer.

Why do different individuals resembling each other in a general way and existing in the same environment suffer from different diseases?

Specific morbidity does not pretend to solve these problems, but it certainly does provide a solution in some cases in that it shows that there is a relationship between the anatomy of the individual and his pathological proclivities. This has been clearly stated by Sir Auckland Geddes.

Certain external anatomical characters are the outward signs of corresponding internal features which, while normal in the individual, yet confer on him a tendency to certain diseases to which the term specific morbidity has been applied. To describe the findings of this specific morbidity one would require more space than could be allotted to an article such as this, but some of the conclusions can be mentioned.

The narrow backs are liable to suffer from tuberculosis, probably because the high ascent of the lungs above the clavicular line combined with a poor range of chest and diaphragmatic expansion leaves an unventilated area at the pulmonary apices which favours the development of the ever present tubercle bacillus. They also suffer from nervous diseases and acute mental disorders—hyperglandular disturbances, anæmias, chronic right sided abdominal troubles, neurasthenia, and such conditions as sacro iliac strains.

The broad backs tend towards arterio sclerosis—chronic diseases of the liver and kidneys—prostatic hypertrophy—dyspepsias of the hyperchloric type and other signs of vagal hypertonne.

The science of specific morbidity has already been put to practical use

in America [illegible] medically [illegible] abilities the [illegible] the *broade* [illegible] In this way they claim to have reduced their [illegible] the matter of compensation

It would appear [illegible] scope for attention to this science in such a service as the [illegible] Navy If instead of having a standard of recruitment founded on such artificial data as inches in height, or chest measurement the broader view of "types" was adopted, it is very probable that a reduction in the invalidable diseases would be brought about If our "tubercles" and "peptic ulcers" are found to belong to the *narrow backs* as is highly probable—why recruit from this type even if they have two inches of chest expansion and six sixths vision &c ?

In any case the naval service would appear to present great opportunities of correlating types and the diseases from which they suffer and are invalided and in this way assisting the elucidation of this question of specific morbidity

One of the best introductions to this subject is to be found in A W Cochrane's "Orthopædic Surgery" (Livingstone) to which book the writer wishes to acknowledge his indebtedness

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IN OLD MADRAS

By Surgeon Commander CHARLES H M GIMLETTE R N

Madras possesses few ancient monuments, the city has been largely the creation of the British Government in India and consequently its chief historical interest centres in the seat of government Fort St George

These notes were made during a visit to Madras in February, 1928 and my chief excuse for making them is that the church records are of considerable historical interest and one at least has a medical interest as well Fort St George began in 1640 as a small fortified settlement for the English trading community The rival Dutch merchants were threatening an attack and to meet this danger Francis Day on behalf of the East India Company obtained the lease of a small strip of land at Madraspatam from the Naik

Fort St George was the earliest of the British fortified settlements in India In 1666 an outer and larger fort was built and the older inner fort fell into decay, and there is trace of it now The plan of the fort remained much the same from 1666 till after the French occupation of 1746 [illegible] when it was decided to enlarge it the work was taken in hand in [illegible] and completed by 1787 The fort thus completed was much the

[illegible] it to-day. The chief difference is that the sea, which once lapped its walls has now receded to a distance of 500 yards; this is due to the construction of the breakwaters of the present harbour which has caused the sand to silt up.

In the fort there are still to be seen the quaint old world streets of the merchants' houses. The top floors are still used as dwellings, being occupied by the resident officers. The ground floors are still used as store rooms; they were originally the "godowns" of the merchants who also used the top floors as their dwelling places. Inside are several buildings of interest. The present office of the Accountant General was at one time the residence of the Governor of the Fort and as such was occupied by Clive at the time of his marriage. The Officers' Mess was originally the Stock Exchange of Madras and the money for its construction was raised by public lotteries. The present Council Chamber occupies the site of the original chamber and its pillars are those taken from the colonnade erected by the Governor, Sir Thomas Pitt, in 1734.

By far the most interesting building in the fort is the Church of St Mary. It was the first Anglican church built in India and was completed in 1678. It was built entirely by private subscription. It was designed and built by the Chief Gunner and designer of Bastions to the East India Company, who made the roof five inches thick so as to be bomb proof. In 1681, Elihu Yale became Governor. He was an American colonist by birth, but was educated in England. He was married in the church, and his was the first marriage to be solemnized there. His three children were baptised there, and these records are all preserved there and are objects of veneration by American tourists to-day. In 1697 Yale presented a very large silver alms dish to the church which is still in use to-day. On his return to England Yale was asked by some colonist friends to help them in founding a place of learning in America. Yale replied to this request by sending a gift of books worth over £500, to the infant university, which was subsequently to be known as Yale University. In the church there is a well preserved Bible, printed in 1660 which was the property of the Governor Masters, at the time the church was founded.

Another original document of interest is a Prayer for the East India Company dated 1694, which was printed and sent out by the Bishop of London. This prayer is so liberal minded and modern in its outlook that it is worth quoting in part.

After a preamble the prayer runs thus —

"That we may all discharge our duties faithfully, and Live virtuously in due Obedience to our Superiors and in Love Peace and Charity one toward another. That these Indian Nations among whom we dwell, seeing our sober and righteous Conversation, may be induced to have a just Esteem for our Holy Profession of the Gospel of our Lord and Saviour."

Besides the record of the marriage of Yale there is the entry of the marriage of Robert Clive.

[illegible] small pox in 1764, as follows —

Upon considering the happy success inoculation has ever [illegible] met with and the many lives under Providence it has been the means of preserving and the general observation that the best sorts of small-pox is therefore produced the danger next to nil and the recovery easy, it is agreed to desire the Surgeon to attend the Hospital when the season is most proper to inoculate such Charity children as have not yet had the small-pox

Another document of historic interest to be seen is the original letter of Clive to the Governor of the Fort Lord Pigot, giving an account of his movements and a plan of the Battle of Plassey which he had just fought

Clinical Notes.

THREE INTERESTING SURGICAL CASES FROM THE ROYAL MARINE INFIRMARY DEAL.

By Surgeon Commander R. H. McGIFFIN

(1) (i) Perforated Appendix (ii) Retro-vesical Abscess with Septic Infarct of Lung

A. Y. R.A.F., admitted from Manston with a history of having eaten salmon three days previously which was followed by paroxysmal abdominal pains and vomiting the same night and a continuation of the symptoms On examination, the abdomen was rigid and tender and the patient was distressed Immediate operation was carried out by opening the abdomen through a paramedian incision A large quantity of pus and fluid escaped and a gangrenous appendix was found which had perforated The appendix was separated with difficulty from the surrounding structures and removed and the abdominal cavity was drained by a large tube placed in the pelvis and right flank The patient made a satisfactory progress Twelve days later his temperature suddenly shot up to 102.4° F The track to the pelvis had almost closed and the discharge had stopped except for a bead of pus It was decided to explore and under ether the track was opened up and washed out with peroxide of hydrogen The patient felt more comfortable, but the temperature remained up and it was evident that there was a septic focus somewhere else The next night, at 9 p.m the patient was distressed temperature 102.8° F, pulse 104 and an exploratory operation was decided on An incision was made over the left iliac fossa, and a large pocket of pus was opened which communicated with another pocket behind the bladder A large drain was inserted into this and a stab wound made in the middle line and a third drain inserted The temperature dropped to 100° F and the patient felt more comfortable but next day he developed a cough with large quantities of reddish brown sputum which was most offensive Temperature 100.9° F pulse 120 On examination an infarct was found at the base of the left lung the patient complained of no pain or discomfort except the offensive nature of the

sputum This condition did not clear up for five days, but the patient with careful treatment and nursing gradually recovered, and was discharged to duty twelve weeks after admission

(2) (i) Perforated Gastric Ulcer (ii) Malignant Growth of Stomach

Z K, marine was admitted with an acute abdomen Immediate operation was performed by opening the abdomen through a right paramedian incision above the umbilicus A very indurated ulcer was found on the lesser curvature of the stomach at the cardiac end with a perforation in the centre over ½ in in diameter This was closed by suturing the healthy part of the stomach wall across the ulcer with Lembert's sutures The ulcer was of a malignant type the growth involved the œsophagus and was inoperable. The glands in the omentum were very enlarged but no secondaries were found in the liver, although the patient was jaundiced Drains were inserted into the right flank and pelvis and the abdomen closed in layers The patient made an uninterrupted recovery, gaining 10 lbs. He gave a history of noticing that he was jaundiced and losing weight for about four months before the ulcer perforated, and that a fortnight before the perforation occurred he had felt a dull pain over the gastric area after food This case was invalided

(3) (i) Perforated Appendix (ii) General Peritonitis

R A C was brought to the infirmary at 3 15 a m by a local practitioner the patient was in great pain and distressed and unable to lie down abdomen board like A history was given of having had colicky pains two days previously and purging himself, and whilst his bowels were acting at 3 a m he was suddenly seized with an acute pain Immediate operation was performed by opening the abdomen through the right rectus muscle A considerable amount of foul-smelling fluid was evacuated, and the appendix was found to be completely gangrenous This was removed with difficulty, and the cæcal end was cauterized with pure carbolic Evidently a large appendix abscess had suddenly burst into the peritoneal cavity The abdomen was closed in layers and drains were placed in the pelvis right flank and centrally over the pubes The patient made a good recovery, being discharged to duty two months after the operation

In reviewing cases such as the above there is one thing I would like to emphasize I have found that injections of antisepsis vaccine 0 2 to 0 4 c c given every five days act like magic and clear up cases which appear to be hopeless

A FATAL CASE OF POISONING BY ASPIRIN

By Surgeon Commander F C HITCH

A fatal case of poisoning by such a common drug as aspirin which at the present time is widely regarded as an ordinary household remedy can hardly fail to be of interest Most of the recorded non fatal cases of poisoning by this substance have been due to the effects of ordinary medicinal doses and persons exhibiting a special idiosyncrasy towards it the most usual symptoms being transitory urticaria and localized œdema Other toxic symptoms which have been recorded after relatively small doses in susceptible patients are palpitation, dyspnœa weakness, and progressive unconsciousness, together with the passing of dark green urine, the colour of which is due to the salicylic acid derivatives In the case to which I desire to draw attention however death was caused by a massive dose of roughly 1 000 grains of the acid

The patient, a male, aged 31, first came [illegible] by a [illegible] officer at 1 p.m. on May 7, 1928. According to [illegible] he [illegible] to have been very drowsy for the preceding few hours, [illegible] when examined [illegible] mentally confused, and unable to concentrate upon what was then [illegible]. It was eventually elicited that he had taken at about [illegible] on the previous day—that is, about twelve hours before being examined—no less than 200 5-gr. tablets of aspirin which he had purchased at a local [illegible] of reputable firm of chemists. His alleged reason for so doing has no direct bearing on the medical aspects of the case.

During the afternoon of May 7 he was admitted to [illegible] R.N. Hospital, Haslar, [illegible] and in a comatose condition, although he could be made to understand simple commands such as an order to put his tongue out. There appeared to be [illegible] discomfort in the epigastric region with a general cutaneous [illegible] the patient resisting examination. The pupils reacted normally and [illegible] reflexes were obtainable. The pulse rate was 130, respirations 36, and the temperature [illegible] to 100° F. At 7 p.m., two hours after admission, he became deeply comatose, extremely dyspnoeic, and passed urine and faeces involuntarily. There was no vomiting. An hour later he developed a violent tetanic convulsion and died.

The urine [illegible] normal in appearance, showing no signs of the greenish discoloration which has been noticed in some of the previously recorded cases of aspirin poisoning. The specific gravity was 1 020, reaction acid to litmus, and a faint cloud of albumin was given on testing with salicyl sulphonic acid and by boiling. A few epithelial cells and leucocytes of no pathological importance were present. On testing for salicylic derivatives by the ferric chloride reaction an intensely strong positive result was immediately obtained.

The cerebro-spinal fluid obtained by thecal puncture was clear, not under increased tension, and showed no pleocytosis or excess of globulin. The *Lange* curve was negative. Here, again, the ferric chloride test gave a very strong positive result.

Treatment consisted in the administration of alkalies and rectal salines together with [illegible] and oxygen. Gastric lavage was not performed owing to the length of time which had elapsed since the ingestion of the acid, and the condition of the stomach walls found at the necropsy suggests that such procedure would have been unwise. Had the patient come under observation within a reasonable time after taking the aspirin it would appear to have been the correct treatment to adopt.

At the post-mortem examination the most interesting feature was the condition of the alimentary canal. The stomach contained 128 c.c.s. of greyish brown fluid which on examination was found to consist of fatty substances, and some food debris, with a large quantity, the exact amount of which I was unable to estimate, of salicylic acid derivatives. The mucous membrane of the fundus and cardiac end showed extensive submucous haemorrhages, and the fundus was deeply eroded and thinned.

The duodenum appeared healthy, showing no congestion or haemorrhages of the mucosa. The remainder of the small and the large intestine was carefully examined and appeared normal throughout. I wish to emphasize this point as it would appear to be at variance with the usually accepted views of the absorption of acetyl salicylic acid in the body. Aspirin is considered to pass through the stomach practically unchanged, but on reaching the alkaline secretions of the small intestine to become decomposed, and to be absorbed as salicylates. The experiments of Martindale and Westcott [1], confirmed by Professor H. Llewellyn Smith, demonstrated that acetyl salicylic acid ($CH_3CO.O.C_6H_4COOH$) is split up in the stomach to an extent not exceeding 5 per cent of the total amount taken. Similar results were obtained by Haczlik and Preslie [2], who also con

[illegible] decomposition [illegible] temperature [illegible] In the present case, [illegible] of the 1,000 gr. [illegible] were decomposed, thus [illegible] of salicylic acid [illegible] one may presume to [illegible] damage to the stomach [illegible] corrosive action.

It is a little [illegible] difficult to explain the immunity of the remainder of the digestive tract.

In 1919, Lewis [illegible] reported a case of a man who had been under treatment for two days for influenza and who took eighteen 5 gr. tablets of aspirin given to him by a medical [illegible], together with a certain number of his own, within the course of six hours. The next day he exhibited profound coma, his pulse was weak, and irregular [illegible] 140 per minute, and vomiting occurred. These symptoms were followed by the passage of large quantities of blood per rectum, a rapid loss of consciousness and death. At the necropsy the last five feet of the ileum were acutely congested, and the caecum and colon were filled with large blood clots. There was a definite line of demarcation between the healthy and congested bowel. The small intestine was uniformly inflamed with disappearance of the mucous coat, leaving the submucous coat and blood vessels exposed and eroded.

These findings are in striking contrast to those in the present case where the stomach bore the brunt of the attack, the intestines being apparently unaffected. It must be remembered, however, that the man was already suffering from influenza, and that all the pathological lesions could not certainly be wholly attributed to the action of the aspirin.

In the present case, apart from the gastric lesions, no other remarkable changes were found at the post-mortem. The blood was apparently darker and more fluid than normal, and the blood serum gave in the same way as the urine and the cerebro-spinal fluid a very strong positive result to the test for salicylates. The heart was normal, lungs congested and oedematous at both bases. The liver and kidneys rather darker than normal. There was a noticeable degree of oedema of the meninges covering the frontal and parietal lobes, but no other naked eye pathological changes were discovered.

REFERENCES

[1] [illegible] Ext. Pharm. 1928 [illegible]

[2] [illegible] 1919 [illegible]

TWO ACUTE ABDOMENS

By Surgeon Lieutenant C. KEATING, M.B., M.Ch., R.N.

The two cases described in these notes seemed to be worthy of publication inasmuch as they occurred within twelve days of each other and necessitated two laparotomies on board H.M.S. *Enterprise* at Trincomali, the nearest general hospital being at Colombo, which is about ten hours away by an indifferent road and twelve hours by train.

(1) Fulminating Appendicitis. A. B., aged 22.

This patient reported at the sick bay on the morning of February 6, 1928, complaining of generalized pain in the abdomen of about twelve hours' duration; he had vomited early that morning. Temperature 99.8° F.; pulse 88. B.O. [illegible]

Examination revealed some reduction of the inspiratory movement of the abdominal wall, which resisted palpation all over, particularly in the right iliac

[illegible] no rigidity [illegible] He was put to bed [illegible] a liquid diet [illegible] result

That evening the pain was [illegible] the pulse continued tending [illegible] night and next day the abdomen was opened by me at 09.00 [illegible] anaesthesia (C_2 E_3 and subsequently pure ether) administered [illegible] Commander H F Stephen

McBurney's incision was made and the abdominal cavity was opened without any difficulty A large mass composed of omentum and small intestine was found to the right of the middle line and adherent to the anterior abdominal wall The general peritoneal cavity was packed off with swabs and the adhesions were gently separated the appendix being discovered in the centre of a large putrid coli abscess The appendix was gangrenous and perforated at its extremity and close to its caecal attachment and was exuding coli pus With some difficulty the appendix was removed as was also a mass of gangrenous omentum which was infiltrated with pus a drainage tube was inserted at the site of the abscess and the abdomen was rapidly closed The patient was returned to bed in Fowler's position there was no post operative vomiting urine was voided normally and the patient's general condition was favourable considering the gravity of the condition found at the operation He was given saline enemata and fluids by the mouth About twenty four hours after the operation the pulse became markedly worse and circulatory failure of the extremities was apparent and despite cardiac stimulation became worse. All this time the abdominal wound was draining freely and his bowels were opened naturally The same evening the pulse was 138 and the temperature had fallen to 100 2° F

Active stimulation had little effect and the cardiac condition became worse and the patient died on the morning of February 9 nearly forty eight hours after the operation

(2) Perforated Gastric Ulcer A B aged 27

This patient was admitted to the sick bay on February 18 1928 at 11.45 whilst at Tinsomah complaining of severe pain in the abdomen which doubled him up The pain had come on very suddenly three minutes before He had no history of previous pain he had never vomited nor had diarrhoea, or any "indigestion" His last meal was at 07 30 a liberal breakfast Temperature 98° F pulse 88 thready

I happened to be at the sick bay when he arrived and examined him with the following result Very shallow respirations no abdominal movement The whole of the right abdomen was board-like and extremely tender He located his pain fairly low down in the right epigastrium extending towards the right anterior superior spine The abdomen gave a hyperresonant note on percussion liver dullness was much reduced Auscultation of the lungs gave no physical signs

A diagnosis of perforated gastric ulcer was made and the sick bay was rapidly prepared for an emergency laparotomy

Under general anaesthesia (C_2 E_3, and subsequently pure ether) administered by Surgeon Commander H F Stephen, the abdomen was opened by me at 14 00 (two and a half hours after the perforation) A right pararectal incision was made about 2 in long just above the umbilicus and the rectus was retracted inwards When the peritoneum was opened a gush of opaque exudate came forth confirming the diagnosis The incision was prolonged upwards towards the costal margin, and the general peritoneal cavity was shut off with three large gauze swabs, and a hand passed into the wound encountered an indurated mass on the anterior gastric wall close to the pylorus After a little traction the stomach was drawn down into the wound and a large

[illegible] through it. The stomach [illegible] was held [illegible] gentle [illegible] string suture of catgut [illegible] inserted [illegible] the ulcer [illegible] invaginated into the stomach and the [illegible] tight and tied off. The abdomen was closed in three layers, no drain being inserted.

There was [illegible] post-operative [illegible], and the patient made an uninterrupted recovery, the skin sutures being [illegible] on the tenth day.

He was carefully dieted and was given [illegible] of mist. bismuthi alkaline, [illegible] [illegible] and was discharged to the General Hospital, Colombo, a fortnight after the operation, for convalescence.

I am indebted to Surgeon Commander H. E. Stephen for permission to publish these notes.

HELIOTHERAPY IN LARYNGITIS

By Surgeon Commander H. M. BRAITHWAITE

The value of heliotherapy in the treatment of disease, especially tuberculosis, has long been recognized, but it is only recently that it has been employed in laryngeal affections by direct application.

There is a note in the latest edition of Dan McKenzie's "Text Book of Diseases of Throat, Nose and Ear, 1927," to the effect that "remarkable results have been claimed for heliotherapy by direct application in tuberculous laryngitis," but that is all.

Three cases of laryngitis are now reported. It must be stated at the outset that none of these three cases were definitely proved tuberculous; they were only presumed on circumstantial evidence. The only instrument used was the laryngeal tube spatula with which the anæsthetist is supplied with for intra-tracheal anæsthesia.

The first case was a thin spare man, aged 28, who had suffered from pleurisy in 1915, laryngitis in 1918 and 1927. He was was on the sick list in the R.N. Hospital, Malta, from February 23, 1928, for forty-seven days with laryngitis. No definite signs of tuberculous disease were found in the lungs or larynx, only adductor paresis of the vocal cords being present. A radiogram of the thorax showed increased fibrous tissue in both lungs and calcified glands at the hila. Various forms of treatment, including electrical, produced no benefit. Finally direct sunlight was tried. Under cocaine a laryngeal tube spatula with the lamp removed was passed into the throat to just beyond the epiglottis, and the patient sat in the sun with the rays streaming down his larynx for fifteen minutes. Next day the tube was passed without cocaine and the sitting lasted twenty minutes. On the third and succeeding days the patient passed the tube himself, and sat in the sun for thirty minutes. He could tell by the heat of the sun's rays whether they were on the right spot or not. Great improvement resulted in three, and complete cure in ten, days.

The second case was a weedy looking man of 37, who gave a history of influenza in 1918 with prolonged convalescence. For the last four years his voice had been husky, and it had become worse lately. He was admitted to the R.N. Hospital, Malta, on April 10, 1928, and remained ten days. No definite signs of tuberculosis were found in him, but there was an ulcer on his left vocal cord. Direct sunlight for a total time of five and a half hours, spread over eight days, cured him.

The third case was much more like real tuberculous disease, and the result of treatment was striking. This was a private patient who had suffered from dysphonia and dysphagia for the last four years. Her right lung was clinically

[illegible] a radiogram [illegible] [illegible] oscope and [illegible] at the left [illegible] area [illegible] of [illegible] Direct application of [illegible] completely cured the laryngeal [illegible] at gradually lengthening [illegible]

CUTANEOUS DIPHTHERIA

[illegible] HITCH, R.N.

ALTH[illegible] the diphtheria bacillus is a condition quite well kn[illegible] occurrence, and the occurrence of a case in the Navy is [illegible]. Before the war comparatively few cases of this dis[illegible] recognized. In 1908 Slater [1] described a case in a girl [illegible], with a [illegible] vesicular rash of three years' duration which [illegible] of specific [illegible] the unfortunate child was treated with mercury and iodide for two years without any appreciable effect, and was only cured when the correct bacteriological diagnosis was made. At the same time Bidlowes and Hare [2] recorded a case of severe ecthyma, also in a girl, due to diphtheritic infection. During the war cases of cutaneous diphtheria increased in frequency in most of the belligerent countries and in Germany were attributed by Peiper [3] to defective cleanliness due to the absence of soap. Fischerstein [4] of Breslau described an eczematoid form of diphtheritic infection of the skin, the site of predilection being the ear, on which all stages of acute eczema may be present, extending also to the occipital region, neck and face. He states that the axillæ, interdigital spaces of the toes and the external generative organs are also liable to be attacked. In 1921, Spiegelberg [5] reported eleven cases, one of which was followed by motor and sensory paresis. Warren and Sutton [6] recorded a case of varicella in a boy of 5 in which the lesions took on an impetiginous character and became infected with the Klebs-Loeffler bacillus. He developed extensive crusted lesions and died apparently from toxæmia. Another interesting form of cutaneous diphtheria is that described by Walshe [7] and Craig [8] and many others under the name of "desert," "septic," or "veldt" sores, which were prevalent among our troops, especially in the campaigns in Egypt and Palestine. This is a localized superficial cutaneous ulceration, chiefly occurring on the hands, forearms and other exposed parts of the body. Starting as vesicles, shallow ulcers develop passing into a stage of chronic ulceration. 197 cases were examined bacteriologically by Craig and in no less than 67 o per cent diphtheroid or morphological diphtheria bacilli were present. Virulence tests on guinea-pigs and quail, which are very susceptible to diphtheria, were positive in some of these cases. In this connection it must be remembered that diphtheroid bacilli morphologically, and indeed culturally, resembling the diphtheria bacillus are very widespread and many varieties may be regarded as harmless saprophytes. A final diagnosis of cutaneous diphtheria should therefore only be made when a positive result has been given by a virulence test. The importance of the virulence test seems to be well illustrated by the following case to which I desire to call attention.

A man aged 27 was admitted to the R.N. Hospital, Haslar, in February 1928 with "furunculosis" of the left side of the neck and an oval impetiginous patch about 2 in. in its long diameter on the left side of the scalp. Behind the left ear there was a weeping fissured eczematous lesion. The patient was treated in the usual way for impetigo, and in addition an autogenous vaccine of *Staphylococcus*

... prepared ... of the lesions ... No improvement resulted. Ultra-violet light ... tried. After forty-four days in hospital he developed a sore throat and ... (temperature 101 F). On examination, a distinct membranous patch was found to be present on the right tonsil. A throat swab was taken and morphological diphtheria bacilli were grown. At the same time a culture from the eczematous area behind the left ear gave a pure growth of the same organism. A virulence test done with a subculture of this bacillus on a guinea pig resulted in the death of the animal in three days with typical post mortem findings. Treatment with diphtheria antitoxin was started at once and the skin lesions rapidly cleared up. An attempt to discover the origin of the infection was unsuccessful. Throat and nasal swabs were taken from all the other patients in the ward and from the nursing staff, and all were negative (27 in number).

REFERENCES

(1) *Lancet* 1908, i, 15.
(2) *Ibid* 1908, i, 982.
(3) *D. med. Woch.* 1919, xlv, 1087 (*Med. S.*, January 1, 1921).
(4) *M. l. Kl.* 1922, xviii, 165 (*Med. Sci.*, January 7, 1922).
(5) *Dermat. Woch.* 1921, xlv, 1018.
(6) *Jour. ... Med. Assoc.* 1927, lxxxix, 1084.
(7) *Lancet* 1916, ii, 232.
(8) *Ibid.* 1917, ii, 41.

Reviews.

BAILLIÈRE'S SYNTHETIC ANATOMY. By J. E. Cheesman, Deputy Medical Officer for Leyton, London. A series of drawings on transparent sheets for facilitating the reconstruction of mental pictures of the human body. First edition. London: Baillière, Tindall and Cox. 1928. Part IX (Head and Neck). 13 figures in the text. Price 2s. 6d. net.

A very ingenious and cleverly arranged idea, which more closely approximates to a real dissection than the diagrams and illustrations in a textbook. Visualization is an asset for the student studying anatomy, and this the author has certainly supplied in its simplest form. We congratulate him on his achievement and we have every confidence in recommending this series of drawings.

S. W. W.

TREATMENT BY MANIPULATION. By A. G. Timbrell Fisher, F.R.C.S.Eng., late Hunterian Professor, Royal College of Surgeons, Eng., &c. Being the second edition of "Manipulative Surgery." London: H. K. Lewis and Co., Ltd. 1928. Pp. 200. 62 illustrations. Price 9s. net.

No subject is of more importance to naval medical officers than orthopædic surgery: its importance grows every day with the increase in road and flying accidents, in addition to the many fractures and strains occurring in ships.

A knowledge of the latest theory and practice in their treatment should be one of the naval surgeon's strongest suits, for his experience of these cases can be as wide as any. Of late years there has been a growth of unqualified practice by the so-called "bone-setters" in joint cases, who have gained repute with the public by successes numerous enough to be undimmed by their failures. That unqualified practice is undesirable, and bad for the true progress of medicine, is plain. Its existence must, however, be due partly to the failure of qualified men to treat these cases successfully, and cases are met with now and then where

beyond [illegible] method [illegible]

A [illegible] Learn, then to [illegible] bone setters

H [illegible] holds that [illegible] cases the [illegible] the [illegible] without any [illegible] or physiological [illegible] of the [illegible] they have [illegible] principle [illegible] often neglected. According to him [illegible] successes of [illegible] in which the disability [illegible] due to adhesions [illegible] by too prolonged [illegible] immobilization after injury.

Every practitioner is familiar with the "relapsing knee" which after a ligamentous strain or other [illegible] of traumatic synovitis, improves while the patient is kept at rest only to fill up again and incapacitate him as soon as he is allowed up.

Manipulation by breaking down adhesions may cure such a joint but the better way is the avoidance of adhesions by earlier movement after injury unless the probability of tuberculous or other grave infection makes it bad practice on other grounds. In his admirable descriptions of the anatomy of various joints the author shows that in most cases there are synovial pockets where folds of membrane which in health glide easily upon each other become adherent during synovitis if immobilized too long.

One such pocket lies under the lateral ligament of the knee, and is the cause of the recurrent effusion and disability to which reference has been made. Free mobilization under an anaesthetic is the best treatment but prevention by earlier movement after injury is better still. The author evidently holds that the manipulations performed by bone setters are not mysterious or complex procedures the ordinary movements of the joint are repeated, and what special gift of touch or judgment is called for is needed mainly to recognize the strength of the adhesions so that damage may not be done by undue strain on the bones and ligaments. When adhesions are slight movements may be free, and may be performed with the limb used as a long lever; when stronger and tougher the limb is held shorter and more gradual effort made. He holds that a series of small gains in mobility provokes less reaction and gives a more permanent result than an attempt to regain full range of movement in one operation.

Stress is also laid throughout the book on the existence of a functional element in these cases and on the need for prompt re-education of the patient and of his muscles in order that the gains by manipulation may be held and consolidated.

The section on displaced and fractured semilunar cartilage is most interesting stress being laid on the fact that diagnosis between displacement and ligamentous strain is made mainly on a minute and accurate history of the mechanics of the original accident. The author states that after removal of a cartilage his patients may be allowed to walk by the seventh day which emphasizes his views on early movement. The success now attending the ambulant treatment of fractures in Delbet plasters and the like further supports these theories.

This is a book well worth studying it is excellently printed easily read, and well illustrated and arranged. J. A. M.

Surgical Anatomy. By Grant Massie M.B., M.S. Lond. F.R.C.S. Eng. Senior Demonstrator of Anatomy and Surgical Tutor Guy's Hospital Medical School. First Edition. London: J. & A. Churchill. 1928. Pp. 397 & Index. 121 illustrations. Price 15s.

The author has certainly achieved his aim in presenting to the student a surgical anatomy in which the dry bones are clothed with matters of surgical

and physiological [illegible] The anatomy of the [illegible] is fully and clearly described It [illegible] that although [illegible] and its technique is described yet the [illegible] to make any [illegible] to cholecystography Surely this is a point of [illegible] and value in the [illegible] of gall bladder affections The old [illegible] has been retained throughout, but for those who are accustomed to the new terminology the English rendering of the B N A is also inserted The [illegible] are well reproduced the illustrations are all that can be desired and reflect the greatest credit on the artist Dr L D Y Grasby The book is [illegible] and full of interest and can be confidently recommended

T W M

The Practice of Urology and Syphilology A Surgical Treatise on Genito Urinary Diseases and Syphilis By Chas H Chetwood M D L L D F A C S Attending Urologist and Director of Services French Hospital Consulting Surgeon to Bellevue Hospital, Special Consulting Surgeon to Knickerbocker Hospital St John's Hospital (L I City), Nassau Hospital (Mineola) St Agnes and White Plains Hospital Fourth Edition London Humphrey Milford, Oxford University Press 1928 Pp 879 314 illustrations 9 plates Price 42s net

After a short description of the anatomy and the embryology of the uro genital tract the author deals with the diagnosis of the various sexual and urinary maladies in a very complete manner The general technique and the armamentarium of the urologist are fully and clearly described The urethroscopic and cystoscopic diagnoses and technique are well produced The chapter on functional renal diagnosis and roentgenography is exceptionally well written and should be of great value to all who require references on this subject The surgical diseases of the genito urinary tract with their diagnosis, prognosis, and treatment leave nothing to be desired The author gives the requirements for the various operations perhaps this may be a bit superfluous as every operator has his own peculiarities and ideas as to instruments and medicaments that he may require In the closing chapters syphilis and its treatment is fully described and we are glad to see that the author has not omitted from his book the historical value of mercurial treatment in all stages of this disease The book is well arranged and written and contains a great amount of information and is well illustrated throughout

The Early Diagnosis of the Acute Abdomen By Zachary Cope B A M D M S Lond F R C S Eng Senior Surgeon to Out patients St Mary's Hospital Paddington Senior Surgeon to the Bolingbroke Hospital Wandsworth Common Hunterian Professor and late Arris and Gale Lecturer Royal College of Surgeons Fifth edition London Humphrey Milford Oxford University Press 1928 Pp 233 and index 30 illustrations Price 10s 6d net

The rapid appearance of the fifth edition of this work in such a short space of time shows that the book has proved to be of value and interest to its many readers The early diagnosis of acute abdominal conditions is dealt with in a masterly manner so characteristic of the author The volume is well arranged and up to date The diagrams are excellent and show clearly the anatomical facts which are essential to each condition The book is easily read and gives a clear insight into the many difficulties that may be encountered in arriving at a correct conclusion It is a work that can be confidently recommended to all who may be called upon to deal with cases of this description

T W M

THE TREATMENT OF THE ACUTE ABDOMEN [illegible]. By [illegible], M.B., M.S. Lond., F.R.C.S. [illegible] to Out-patients, St. Mary's Hospital, Paddington; Surgeon [illegible] Hospital, Wandsworth Common; late Hunterian [illegible] and Gale [illegible], Royal College of Surgeons. Second [illegible]. London: Humphrey Milford, Oxford University Press. 1928. Pp. [illegible]. [illegible] illustrations. Price [illegible] net.

Many interesting [illegible] been introduced into the [illegible] of this work, which [illegible] maintains its usual high standard throughout its pages. Section II [illegible] Treatment, being exceptionally well produced. It is a valuable book of [illegible], with a wealth of detail essentially useful to the general practitioner [illegible] resident medical officer.

THE INJECTION TREATMENT OF VARICOSE VEINS. By A. H. Douthwaite, M.D., M.R.C.P. Third edition. London: H. K. Lewis and Co., Ltd. 1928. Pp. 51. Price 4s. net.

The author has introduced many new ideas and interesting facts into his third edition. References are made to the interval that should elapse between a series of injections, to the treatment of varices in the region of the saphenous opening, the uses of sodium chloride as a sclerosing agent, and the treatment of varicose ulcers and eczema. This edition is handsomely bound and well printed, and should prove attractive reading to all those interested in the treatment of varicosities by sclerosing agents.

THE MEDICAL PRESS AND CIRCULAR. London: Albert Alfred Tindall, 8, Henrietta Street, Covent Garden. Published Weekly. Price 6d.

The second literary number of the *Medical Press*, dated July 11, 1928, contains an exhaustive list of medical books published during the months of April, May and June. This bibliography is very comprehensive, and designed to cover the literature of the medical and allied sciences of the whole world. For reference purposes it will be found most useful.

A TEXTBOOK OF INFECTIOUS DISEASES. Being the Third Edition of Goodall and Washbourn's "Manual of Infectious Diseases." Revised and in large part rewritten by E. W. Goodall, O.B.E., M.D., B.S. Lond., Member of the General Nursing Council of England and Wales; Vice-President, formerly President, of the Section of Epidemiology and State Medicine of the Royal Society of Medicine; formerly Officer Commanding The Grove Military Hospital; Medical Superintendent of the Eastern Hospital of the Metropolitan Asylums Board; Teacher of Specific Fevers at the Royal Army Medical College; Medical Registrar to Guy's Hospital, and Resident Assistant Medical Officer at the London Fever Hospital; lately Medical Superintendent and Lecturer on Infectious Diseases and Fever Hospital Administration at the North Western Hospital of the Metropolitan Asylums Board. London: H. K. Lewis and Co., Ltd. 1928. Pp. xvi + 718. With 26 plates (including six coloured) and other illustrations, 115 diagrams and 34 charts. Price 30s. net.

A period of nineteen years has elapsed since the second edition of a "Manual of Infectious Diseases" was published. During that time our knowledge of these diseases, especially in the field of bacteriology and immunology, has made rapid strides. Further, the reappearance of certain infectious diseases, especially epidemic poliomyelitis and encephalitis, has introduced fresh problems. It has, in

consequence, been found necessary to enlarge the manual considerably. In the introductory chapter a brief account is given of the principles of modern epidemiology, a knowledge of this subject being of the utmost importance. The causes, &c., of epidemics, the nature of contagion and infection, and the problems of immunity are fully discussed. Anaphylaxis and serum sickness are described at some length, and the results of experimental investigation summed up. Chapters II to VI contain much useful information on the subjects of fever, disinfection, rashes simulating those of the specific fevers, sore throat, &c. The succeeding chapters are devoted to a detailed consideration of the various infectious diseases, which are dealt with in a most complete and comprehensive manner.

Concerning the diagnosis of diphtheria, the author emphasizes the necessity of making and acting upon the clinical diagnosis without waiting for the results of the bacteriological examination; such delay may entail the loss of twenty-four very valuable hours. The responsibility for diagnosis rests with the medical attendant and not with the bacteriologist. The vexed problem of the "carrier" receives due consideration, and the procedure recommended for adoption in the case of virulent and avirulent carriers is clearly laid down. In the chapter on measles an excellent description is given of Koplik's spots, and of the conditions, normal and pathological, which may be mistaken for them. The blood serum of persons who have passed through an attack of measles contains antibodies that will confer a temporary protection upon a susceptible person into whom the serum is injected. It is considered advantageous to confer even a temporary protection and so defer an attack in the case of a young child. In America and on the Continent centres have been formed for the collection and distribution of the serum of adults who have had measles, and of patients who are convalescing from the disease. Reference is made in Chapter XVIII to the recent benign epidemic of small-pox in this country. Some observers have suggested that it is neither small-pox nor chicken-pox, but a third disease, viz., alastrim. The writer, however, agrees with the majority of the experts that the disease is small-pox and nothing else.

We have nothing but praise for this most excellent treatise, which is thoroughly up to date and can be strongly recommended to every class of reader. The book is well printed and illustrated, the four coloured plates representing Koplik's spots and certain lesions which have commonly been mistaken for them being exceptionally good.

MENTAL DISORDERS: A Handbook for Students and Practitioners. By Hubert J. Norman, M.B., Ch.B.Edin., D.P.H.Edin. and Glas., Medical Superintendent, Camberwell House, London; Lecturer on Mental Disorders, Westminster Hospital Medical School. Edinburgh: E. and S. Livingstone. 1928. Pp. xv + 463. 57 illustrations. Price 14s. net.

The author remarks of this recent book that if it be said there is nothing new, at least he may hope that something is achieved in the way of looking at old truths from a different angle. He is not sufficiently converted to a belief in the latest theories to adopt—for the present, at any rate—a revolutionary attitude towards the past and towards the great men who are its representatives. In the earlier chapters the actual mental disorders are discussed. This is in deference to the custom of readers of books on mental disorders skipping lightly over the psychological portions and turning their attention to the more practical parts. The book is divided into two sections. In Section I the clinical aspects of psychiatry are dealt with in a very clear and lucid manner. The various forms of mental disorder are classified under three main heads, viz.: (a) Disorders associated with constitutional instability; (b) insanity associated with psychoses; and (c) symptomatic or associated disorders.

Concerning aetiology, [illegible] hereditary factor is considered [illegible] the most important. In this connection the [illegible] points out that the [illegible] War demonstrated very clearly the special effect of [illegible] trauma, etc upon those individuals in whom there was inherent def[illegible] the nervous system [illegible] already weakened by some acquired degenerative processes. Extraneous factors which are sufficient in themselves to bring [illegible] in the central nervous system, and consequent mental disorders are syphilis, alcohol, drugs and head injuries. Usually there is a combination of causes. Consanguinity in the parents alone does not appear to be prejudicial to the offspring. But if there is a bad family history, consanguineous marriages will naturally tend to accentuate the nervous defect.

Section II opens with a historical survey followed by successive chapters dealing with psychology, pathology, therapeutics and legal considerations. Chapter XXVII, on "General Treatment" contains much sound practical information which will be found of great assistance in the management of cases of mental disorder. Included in this section is a most interesting chapter on "Clinical Examples in Life and Literature". This book is eminently readable, is well produced and contains numerous excellent illustrations. It can be strongly recommended to students and medical practitioners.

A Manual of Surgical Anatomy. By Charles R. Whittaker, F.R.C.S.Ed., F.R.S.E., Assistant Lecturer on Anatomy, Surgeons' Hall, Edinburgh; Examiner, Royal College of Surgeons, Edinburgh. Fourth edition. Edinburgh: E. and S. Livingstone. 1928. Pp. 471. 126 illustrations. Price 15s. net.

The author has produced a very readable and practical manual of surgical anatomy based on his wide experience as an anatomist and lecturer. He has not only supplied the operating surgeon with a ready book of reference, but also the student with all the requirements for examination purposes. The book is well written and thoroughly up to date. The illustrations and radiograms are well reproduced and reflect the greatest credit on the artist and publishers. The reviewer has been in constant touch with this book since its first edition, and he heartily congratulates the author on his latest edition.

The Examination of the Central Nervous System. By Donald Core, M.D. Manc., F.R.C.P. Lond., Hon. Assistant Physician, the Manchester Royal Infirmary; Hon. Physician, the Manchester Royal Eye Hospital; Lecturer in Neurology, the University of Manchester. Edinburgh: E. and S. Livingstone. 1928. Pp. xi + 248. 14 illustrations. Price 8s. 6d. net.

This little book, which is purely elementary in its scope, is written for the use of medical students, especially for those who have not completed their training in neurology. As the author observes, for the accurate diagnosis of diseases of the nervous system, a knowledge of anatomy together with a well defined method of examination are essential. In addition the student should have a clear knowledge not only of the methods of testing nervous functions, but also at what stage of the examination those tests are most conveniently applied.

A useful scheme is outlined in the introductory chapters for the routine examination of the nervous system, which may be adopted with advantage. The first seven chapters describe in detail the methods of investigation of the motor and sensory systems, cranial nerves, speech, and the psycho-somatic and trophic disorders. An examination into the mental state of any patient being considered of fundamental importance, the mental functions, e.g., power of concentration, memory, emotional, &c., should therefore be investigated. In Chapter X, which

deals with the history of the p[illegible] pointed out th[illegible] assessment of the history from the point of [illegible] physiology [illegible] events is probably as important [illegible] the investigation [illegible] and motor functions of the nervous system. Chapters XI [illegible] routine examination of the pat[illegible] [illegible] spinal fluid X ray examination, electrical reactions [illegible] disorders. The last three chapters [illegible] the mode of onset course of disablement, loc[illegible] disorders. The book is well produced and co[illegible] information in a small space. It can be thoroughly recommended to [illegible] whom it is intended.

THE CLINICAL EXAMINATION OF THE [illegible] By E. M. Br[illegible] M.D.Vict., F.R.C.P. Hon Consulting Physician Royal Infirmary Manchester late Lecturer in Clinical Medicine [illegible] of Clinical Instruction University of Manchester and Albert Ramsbottom M.D.Vict. F.R.C.P. Hon Physician Royal Infirmary Manchester Professor of Clinical Medicine University of Manchester. Second edition. London H. K. Lewis and Co. Ltd. 1928. Pp. 112 + viii. 35 illustrations including 4 plates. Price [illegible] net.

The first edition of this little book giving the outlines of the authors own teaching on the subject was published at the request of students. This present edition contains some alterations in the subject matter and additional material has been added to record new methods of clinical investigation or useful variations in old methods. Commencing with a brief consideration of some anatomical and physiological details the routine examination of the chest is dealt with from the point of view of subjective symptoms and objective signs. Chapters III to VII contain a summary of the main points to be observed as regards inspection palpation percussion and auscultation. The last chapter deals with the physical signs of common pulmonary diseases attention being drawn to typical and atypical signs. The subject is dealt with from a clinical aspect, and the book will undoubtedly prove most useful to students desirous of rapidly revising their knowledge.

GASTRO INTESTINAL DISEASES. Lectures delivered at the James Mackenzie Institute for Clinical Research St Andrews Winter Session 1927. Edited by Professor David Waterston M.A., M.D., F.R.C.S.Edin., Bute Professor of Anatomy University of St Andrews. London Humphrey Milford, Oxford University Press. Pp. 378 + viii. Price 10s. 6d. net.

These lectures form a series delivered at the James Mackenzie Institute for Clinical Research at St Andrews by a number of eminent medical men, each dealing from his own special standpoint with various aspects of gastro intestinal disorders. The lectures proved of great interest and value to those to whom they were delivered. They are now published in book form as it was felt that a wider audience would appreciate the opportunity of them. The subjects dealt with are as follows: (1) Ocular manifestations of gastro intestinal disorders. (2) The influence of diet on the physiology of the stomach. (3) Superficial pain as an aid in the differential diagnosis of abdominal disease. (4) Some aspects of sympto matology in dyspepsia as met with in general practice. (5) Gall bladder disease and gall stones. (6) The clinical significance of haematemesis. (7) Some surgical aspects of gastric and duodenal ulcer. (8) The early symptoms of cancer of the stomach. (9) Some recent views upon carcinoma as applied to the colon. (10) The dissemination of malignant disease with special reference to the abdomen. (11) Some pitfalls in the diagnosis of acute abdominal conditions. The foregoing list conveys some idea of the extensive ground covered by the lectures and

their value is enhanced by the discussion following each lecture. We heartily recommend this book to every medical practitioner who seeks the latest expert views concerning many of the problems associated with gastro intestinal disorders.

RECENT ADVANCES IN TROPICAL MEDICINE. By Sir Leonard Rogers, C.I.E., M.D., B.S.Lond., F.R.C.P., F.R.S., Indian Medical Service Ret. London: J. and A. Churchill. 1928. Pp. viii + 397. 12 figures. Price 12s. 6d. net.

This book is a welcome addition to the "Recent Advances Series" and will prove a real help to those who find difficulty in keeping track of modern work in connection with tropical medicine, the literature of which is voluminous, and not always easily accessible when most wanted. The author presents his subject in a readable though compact form, and yet leaves out little of importance. Wherever modern research can throw light on any aspect of the subject which is dealt with, it will be found in all of the twenty eight chapters which comprise the volume. The bibliography appended to each chapter is full and valuable. To those whose duty includes work in tropical climates, and who desire to be up to date in the subject matter connected with such work, I commend this book as one not to be neglected. H. F. B.

DIAGNOSIS AND SPIRITUAL HEALING. By F. G. Crookshank, M.D.Lond., F.R.C.P., Physician to the Prince of Wales' General Hospital and to the French Hospital and Dispensary, Consulting Physician to the New End Hospital, London. London: Kegan Paul. 1927. Pp. 101. Price 2s. 6d.

The first part of this small volume (No. 6 of the Medical Series, Psyche Miniatures) is a reprint of the Bradshaw Lecture of 1926 on the "Theory of Diagnosis." It is a study of the philosophical aspects of diagnosis, and, although the author's thought sometimes lacks clarity and precision, and his style nearly always does so, it will be found both interesting and entertaining. The impression one gains on reading is that the author holds a brief for *Nominalism* as against *Realism*, and one is surprised to find that in attempting to prove that diseases are not entities he should look for proofs among the "empty noises" of *Nominalism*. Towards the end of the essay the author looks for "compromise and reconciliation," which to the reviewer's astonishment he finds in what he calls Conceptualism, *the conceptualism of William of Occam*! The reader had allowed himself to think that the "singular doctor" was a Nominalist of Nominalists. This last section was unconvincing. In his treatment of the metaphysical reality of species and genera, more attention to the accurately qualified Realism of Aquinas would have saved the author much thought and would also have rendered much of his matter unnecessary.

The second essay printed was originally read at a meeting of the Hunterian Society in 1925. It is written in a somewhat humorous vein, and shows almost another man. It is quite amusing, but cannot be considered as a serious study of the subject of "spiritual healing." F. G. H.

Preparations, &c.

"VAPOROLE" BRAND EPHEDRINE SPRAY COMPOUND

Messrs Burroughs Wellcome & Co have issued a useful "Vaporole" preparation of ephedrine for application to the pharynx and nose by means of an atomiser. "Vaporole" Ephedrine Spray Compound consists of ephedrine 1 per cent, menthol, camphor and oil of thyme of each 2 per cent, in a base of paroleine (a high quality liquid paraffin). Such a spray enables ephedrine to be efficiently applied locally in hay fever and congested conditions of the pharynx and nasal mucosa. It is stated that clinical trials of this new method are exceedingly satisfactory and promise to provide a very effective weapon for the symptomatic relief of hay fever and of engorged and catarrhal conditions of the naso pharynx. The product is supplied in one ounce bottles.

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"Tabloid" Hyoscine Hydrobromide 0.0004 gm (1/150 gr approx.) has been issued for many years as have also several strengths and combinations for hypodermic use, &c.

LIGHT AND HEAT IN MEDICINE SURGERY AND PUBLIC HEALTH

Second International Conference and Exhibition

As previously announced, the Second International Conference on Light and Heat in Medicine, Surgery and Public Health will be held at the University of London, S W 7 on October 29, 30, 31, and November 1.

The Conference will cover as many aspects of the subject as can be achieved in the time available, both the clinical and the scientific sides being dealt with. The sessions will be held in the afternoon and evening of the first three days (Monday, Tuesday and Wednesday) and in the afternoon of the fourth day (Thursday). The papers which will be approximately fourteen in number will each be followed by a discussion in which all medical men are invited to participate.

In order to simplify the arrangements and ensure that all who desire to speak shall be called upon it is hoped that all who wish to take part in the discussion will send their names to the Conference Department *The British Journal of Actinotherapy*, 17 Featherstone Buildings, W C 1. These names will be handed to the Organizing Secretaries (Dr W. Kerr Russell and Dr R. King Brown) who will communicate with correspondents direct.

The full programme of the Conference will be announced as soon as all details are complete. Vouchers for reduced rail fares for those attending the Conference will be available shortly and will be sent on application.

Concurrently with the Conference an Exhibition will be held in the Great Hall and the East Gallery of the University adjoining the Conference Hall. The Exhibition will be open from 2.30 p.m. to 9.30 p.m. each day, closing at 6 p.m. on November 1.

[illegible] Imperial [illegible] South [illegible] or less [illegible] Adequate [illegible] the visitors.

Applications [illegible] Conference and Exhibition [illegible] should be made to *The British Journal of Actinotherapy* [illegible] and Exhibition Department), 17, Featherstone Buildings, [illegible]

News of the Service.

MEDICAL OFFICERS' JOURNALS

[illegible] Medical [illegible] has been [illegible] Medical [illegible] August [illegible] 1928.

OBITUARY

[illegible] the death of Deputy Inspector-General William Digby [illegible] which took place on May 23, 1928. Born October 18[illegible] he qualified in Ireland [illegible] and entered the R.N. Medical Service the following year. He was promoted to [illegible] May 18[illegible], Fleet Surgeon 18[illegible] and was placed on the retired list on account of [illegible] with the rank of Deputy Inspector-General.

[illegible] H.M.S. [illegible] he saw active service with the Naval Brigade in [illegible] April 18[illegible] he was dangerously wounded in action at [illegible]

[illegible] natural history and made a special study of bird life [illegible] He has a memento of this officer's past services [illegible] by himself, which he presented to the [illegible] in 187[illegible]

[illegible] we extend our deepest sympathy.

We regret to record the death of Surgeon Captain John Christopher Durston, R.N. [illegible] which took place [illegible] 1928. Born December 11, 18[illegible] he was educated at the [illegible] Grammar School. Joining the medical school of St. Thomas's Hospital, he [illegible] the diplomas M.R.C.S.(Eng.) 18[illegible], L.R.C.P.(Lond.) 18[illegible] and entered the R.N. Medical Service the same year. Promoted to Staff Surgeon 1[illegible] and to Surgeon Commander [illegible] he was placed on the retired list on account of age on January 1, 1922, with the rank of Surgeon Captain. [illegible] appointment was to the R.M.A. [illegible] on May 189[illegible] and up to [illegible] he held [illegible] appointments in ships and hospitals. While serving [illegible] he was specially mentioned for his valuable services in connection with the [illegible] of the wounded [illegible] soldiers during the fighting at [illegible] on June 17, 1914.

Durston had [illegible] Coming from a great engineering family his chief [illegible] Wherever he went Durston owned [illegible] tool chest and his cabin became a veritable [illegible] shop. Owing to his retiring disposition very few were aware of the fact that [illegible] was a very expert bacteriologist and haematologist. There was very little that he did [illegible] know about these subjects and his blood films were a picture in themselves and were [illegible] highly commented on by the experts in the Far East. All through his career he [illegible] a keen interest in his profession and the Service. His zeal, tact, kindly disposition and the consideration which he showed for others made [illegible] memento which [illegible] to the Service.

[illegible] we extend our deepest sympathy.

We regret to announce the death of Surgeon Captain George [illegible] Hamilton, R.N. (Retd.) [illegible] August 2[illegible], 1928. Born March 187[illegible] he graduated in Aberdeen 1[illegible] taking [illegible] of M.B., B.S. and entered the R.N. Medical Service in May 1901. Promoted to [illegible] Commander May 1912, to Surgeon Commander 191[illegible] he was placed on the [illegible] as medically unfit, March 192[illegible] with the rank of Surgeon Captain. He was [illegible] Medical Examining Officer at [illegible] for recruiting as recently as July last [illegible] in many ships and shore establishments during his service career. A good [illegible] with a keen sense of humour, his cheery disposition and courteous manner endeared [illegible] who came in contact with him.

[illegible] we extend our deepest sympathy.

[illegible] death of [illegible] July 9 1938 a [illegible] Medical Mess, [illegible] well known [illegible] who appeared [illegible] the medical mess [illegible] 1919 at the age of 60 [illegible] well presented [illegible] and testimonial [illegible] officers on the Actors and [illegible] H.M. [illegible] of the esteem [illegible] held and in recognition [illegible]

DEGREES

Surgeon Commander G. H. Hayes, M.B., has obtained [illegible] as a result of passing recent examination

PROMOTIONS

Surgeon Lieutenant M. B. Hat[illegible] to be Surgeon Lieutenant Commander June 30 1938
Surgeon Lieutenant S. C. Ra[illegible] M.B. to be Surgeon Lieutenant Commander August [illegible]

Surgeon Lieutenant R. W. Munsen, M.B. to be Surgeon Lieutenant Commander August [illegible]

APPOINTMENTS

June

Surgeon Commanders W. F. Beattie, M.B. to the R.N.B. Portsmouth [illegible] H. Healey (and as Medical Specialist); H. F. Boggs, M.B., F.R.C.S. to [illegible] M.D. to Curlew; A. W. [illegible] to R.M. Infirmary, Deal. [illegible] Lieutenant Commander J. F. Audley, M.B. to Mars [illegible] Health [illegible] Surgeon Lieutenants R. W. Higgins, M.B. to R.N.H. Hong Kong. Mr. J. [illegible] M.R.C.S., L.R.C.P. entered as Surgeon Lieutenant for Short Service. Mr. [illegible] M.R.C.S., L.R.C.P. entered as Surgeon Lieutenant R.N. for Short Service. Mr. [illegible] M.B. entered as Surgeon Lieutenant R.N. for Short Service. F. C. M. Bamford to Tak[illegible] Mr. [illegible] M.B. entered as Surgeon Lieutenant R.N. for Short Service. [illegible] Hamilton, M.B. [illegible] Mr. L. J. Crabett, L.M.S.S.A. entered as Surgeon Lieutenant R.N. for Short Service.

July

Surgeon Captain [illegible] D. H. C. [illegible] M.D. [illegible] R.N. Hosp. Singapore (and [illegible]) J. S. Crawford to R.N.H. Plymouth (and for special duties); R. A. [illegible] M.B. to [illegible] (and for specialist duties); C. D. Walsh to R.M. Infirmary [illegible]; A. [illegible] Volpe French [illegible] H. Chatham (and as Ear, Nose and Throat specialist); [illegible] M.B. to R.N. [illegible] Headquarters; A. Craig to [illegible] Taylor to [illegible] (and as Squadron M.O.). Surgeon Lieutenant Commander (D) D. Patterson, L.D.S. to R.N.H. Malta. Surgeon Lieutenants T. F. Barker to [illegible]; W. A. Beach to [illegible]; Mr. [illegible] Surnall [illegible] entered as Surgeon Lieutenant R.N. for Short Service. T. L. Close to [illegible] Mr. F. Dolund, M.B. entered as Surgeon Lieutenant R.N. for Short Service. W. P. [illegible] M.B. to R.N.H. Plymouth; W. [illegible] Fitzpatrick to [illegible]; [illegible] Holby, M.B. to [illegible] W. W. Darley, M.R.C.S., L.R.C.P. to Emperor of India; [illegible] J. Bain, M.B. [illegible] to R.N. [illegible] Plymouth; [illegible] Quinn, M.B. to [illegible] H. W. Strong, M.B. to R.N.B. Chatham; [illegible] Malcom, M.B. to [illegible]

August

Surgeon Captain [illegible] Baxter to R.N.B. Devonport. Surgeon Commanders F. [illegible] Black, M.D. to *Repulse* (and for special duties); H. H. [illegible] R.N.H. Chatham (and as specialist in ophthalmology); H. E. Scargill to [illegible] to R.N.B. Devonport (and for specialist duties); R. J. [illegible] to R.N.H. Chatham [illegible] W. C. Thwaytes, M.D. to Nelson; [illegible] Boal, M.B. to [illegible] M.B. to *Queen Elizabeth* (and as F.M.O.); [illegible] O'Riordan, M.B. lent to [illegible] R. J. C. Farnell to *Berke* (and as Squadron M.O. and for specialist [illegible]); G. H. Hayes, M.B., D.T.H. to *Ramillies*; C. Ross to *Impregnable*; G. P. Mahood to Sick Quarters [illegible]; F. L. Wright to *Iron Duke* (and as Squadron M.O.); [illegible] M.B. to *Argus*; H. M. Langdale to Vernon; J. Boardman to R.N.B. Portsmouth; [illegible] Sankey, M.B., Ch.B. to *Warspite*.

[illegible]

SEPT.

[illegible]

RETIREMENTS

[illegible]

DEDICATION SERVICE AT R.N. HOSPITAL, HASLAR

Past and present officers of the Naval Medical Service attended at St Luke's Church, R.N. Hospital, Haslar, on Sunday afternoon, September [illegible], to honour the memory of Dr James Lind, commonly known as the "Father of Nautical Medicine," who was first physician at Haslar for twenty-five years when the hospital was founded nearly two centuries ago. The immediate object of their presence was the unveiling and dedication of a large altar painting which has been placed in the church to the memory of Dr Lind from contributions which have been subscribed by medical officers of the Royal Navy and others. The painting is by Heywood Hardy, R.A., and shows Christ healing the blind. It is in delicate colourings, is 3 ft. [illegible] long by 4 ft. deep, and is mounted in oak panelling over the altar table.

The unveiling was performed by Surgeon Rear-Admiral D. W. Hewitt, C.B., C.M.G., M.B., F.R.C.S., and the dedication by the Lord Bishop of Portsmouth (the Rt. Rev. E. Neville Lovett, C.B.E.) followed. The Bishop, standing at the altar, afterwards addressed the congregation. He said that they were the inheritors of Dr Lind's achievements and service. Looking back they saw that he was a link of [illegible] compassion. That compassion had its beginning in the heart of Christ who went about doing good, healing all manner of disease and sickness. That also was the message of the picture they had unveiled, and the true picture of Christ was in any man's mind unless He was seen to be one desperately

anxious to [illegible] James Lind was one of the most valuable [illegible] through the ages by the erroneous pagan idea that [illegible] and that God meant people to be afflicted. There was [illegible] finished his work of creation. The work of creation [illegible]. He had left over a great part of it to be carried on by [illegible] a mind and a body. Man to be the image of God had [illegible] were not so evil would triumph. The process of [illegible] with God always moving to a higher civilisation and [illegible]

Such an agent of the Creator was [illegible] the scourge in that hospital which [illegible] about 600 patients per annum and [illegible] whose lives were spent at sea were well known. [illegible] discoveries were only tardily adopted [illegible] Physician who was despised and rejected [illegible] after Dr. Lind's death they were [illegible] received [illegible]. The value of no man's work [illegible] foundation for those who come after. So they [illegible] the pioneers.

The other clergymen taking part in the [illegible] the Revs. [illegible] Ross (Chaplain at Haslar Hospital), [illegible] and [illegible] White (Chaplain H.M.S. [illegible]).

The following Subscriptions are gratefully acknowledged:—

	£	s.	d.		£	s.	d.
Surgeon Rear Admiral D. W. Hewitt	[illegible]	[illegible]	0	Surg. Captain J. Mel[illegible]	[illegible]	[illegible]	
Mrs. Hewitt	[illegible]	0	0	Surg. Lieut. R. [illegible]	[illegible]		[illegible]
Mrs. [illegible]			0	Surg. Captain [illegible] W. M[illegible]		10	
Surgeon Vice Admiral [illegible] Gaskell	[illegible]	[illegible]	0	R. W. [illegible]	[illegible]		[illegible]
Surgeon Comdr. F. [illegible] Smith	0	10	[illegible]	Surg. Comdr. [illegible] A. M[illegible]	[illegible]		
Surg. Rear Admiral R. St. [illegible] Dowd	0	10	[illegible]	T. R. [illegible]		[illegible]	
S.R.A. and Officers R.N. Hosp. Malta	[illegible]	10	[illegible]	[illegible]	[illegible]		[illegible]
Surg. Comdr. W. S. [illegible]	1	0	0	W. J. M[illegible]			[illegible]
Comdr. W. [illegible]		[illegible]	0	[illegible]			
Surg. Captain L. M. Morris	[illegible]	0	0	Surg. Captain H. W. [illegible]		[illegible]	
Surg. Comdr. [illegible] Digby Bell	[illegible]	[illegible]	[illegible]	[illegible]		10	
Surg. Captain C. [illegible]	[illegible]	[illegible]		[illegible]			
Mr. H. [illegible] Rose	0	10		Surg. Comdr. W. [illegible] Edge		10	
Miss Chase	0	10	0	Surg. Captain [illegible] L. D[illegible]			
Mr. Lasso	0	5	0	Surg. Comdr. F. [illegible] Merritt	[illegible]	[illegible]	[illegible]
Surg. Captain T. B. Shaw	[illegible]	[illegible]	0	[illegible] P. Shorten	0		
Surg. Comdr. H. [illegible] Parker	0	5	0	[illegible] C. [illegible]			
F. [illegible] D. Twigg	[illegible]		0	[illegible] M. [illegible]		10	0
[illegible] M. Bevan	0	[illegible]	[illegible]	[illegible] W. [illegible]	[illegible]	[illegible]	
L. R. [illegible]	[illegible]	5	0	Surg. Captain J. [illegible]		10	
Surg. Lieut. (D) G. G. Cruickshank			[illegible]	M[illegible] Mrs. [illegible]	0	10	[illegible]
Surg. Comdr. D. D. [illegible]			[illegible]				
				[illegible]	£30	[illegible]	

A balance of £30 [illegible] will be required [illegible] the cost of [illegible]. Many [illegible] officers of H.M. Navy will doubtless wish to take part [illegible] at Haslar where they all started their Service [illegible] Lind. Further contributions will [illegible] gratefully [illegible] and acknowledged by the [illegible] R.N. Hospital, Haslar.

HASLAR REUNION DINNER

In the summer of 19[illegible] it was suggested that all medical officers of ships and establishments [illegible] Portsmouth Command should be asked to dine at Haslar with a view to renewing old friendships and in the words of the organiser "to make a night of it." This also met with great success and three guests were asked from the retired naval medical officers living in the vicinity. Surgeon Rear Admiral Sir George Welch, Deputy Surgeon General [illegible] and Fleet Surgeon [illegible] were the guests and Sir George Welch in replying to the toast of their health said he hoped the dinner would be repeated and that all retired officers would be asked not as guests but as members of the mess.

It was decided to hold the dinner this year while the Atlantic Fleet was in the port and it was fixed for August 2[illegible]. All officers on the active and retired lists in the vicinity were circulated with the result that fifty-eight dined in the mess on that night. This number included twenty-eight honorary members of whom the following were retired officers: Surgeon Rear Admiral

[illegible] Deputy [illegible] Surgeon Captain [illegible] Haydon [illegible]
[illegible] Medical [illegible] presided and in proposing the [illegible] officers [illegible] the dinner as a reunion [illegible] on the [illegible] which he hoped they would [illegible] their [illegible] characteristically [illegible] believe that the walls of Haslar [illegible] tale [illegible] rose to high rank in the branch of the [illegible] that he hoped the dinner would be an [illegible] officers [illegible] a mess for which they all [illegible] engines well for the future [illegible] officers not [illegible] that [illegible] of the [illegible] hoped they will make use of the mess [illegible] the mess than to meet the [illegible] and [illegible] recently joined members of the Service [illegible] of the [illegible] the mess officers are helping [illegible] have a great effect [illegible] rather [illegible] the dinner. It is hoped that [illegible] members of the mess and [illegible] able to send everyone a notice of [illegible] Mess Secretary that [illegible] still next [illegible]
On the [illegible] the Superintendent [illegible] the Royal [illegible] kindly [illegible] which was very much appreciated.

QUEEN ALEXANDRA'S ROYAL NAVAL NURSING SERVICE

ENTRIES

Miss Kathleen Margaret Cooper and Miss Margaret [illegible] Maxwell [illegible] entered as Nursing Sisters July [illegible] 1928.

APPOINTMENTS

Superintending Sister Miss [illegible] Hartley Jones to R.N. Hospital Chatham [illegible] 1928.
Nursing Sisters Miss [illegible] M. Cooper and Miss M. [illegible] M. Trumble to R.N. Hospital [illegible] [illegible] 1928; Miss M. Mitchell to R.N. Hospital Malta, August [illegible]

RESIGNATIONS, &c.

Nursing Sister Miss [illegible] resigned appointment August [illegible]

NORTH PERSIAN FORCES MEMORIAL MEDAL

[illegible] W. H. Dye, Colonial Medical Service, has been awarded the North Persian Force Memorial Medal for the year 1927 for his paper "The Relative Importance of Man and Host [illegible] Human Trypanosomiasis," published in the *Transactions of the Royal Society of Tropical Medicine and Hygiene*, Vol. XXI, No. 3, November, 1927, pp. 187-198.

The medal is awarded annually for the best paper on "Tropical Medicine or Hygiene" published in any Journal during the preceding twelve months by a medical officer of [illegible] [illegible] service of the Royal Navy, Royal Army Medical Corps, Royal Air Force, Indian Medical Service or of the Colonial Medical Service, provided the Memorial Committee consider [illegible] of the papers published has attained a standard of merit justifying an award.

NAVY LIST—MEDICAL OFFICERS' QUALIFICATIONS, &c.

ALTERATION is being made in the method of showing the degrees and qualifications of medical officers in the Navy List. Non-medical degrees will not be shown in future. The alteration will take some time to complete, but it is hoped to revise the whole list by the end of the present year.

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